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Economics of Municipal Airports

ERNEST P. GOODRICH

Court and Commission Relations in Massachusetts

MARY LOUISE RAMSEY

Mississippi River Traffic: 1918-1930

JOHN D. SUMNER

Grade Crossing Elimination in Connecticut

CLYDE OLIN FISHER

Appliance Merchandising by Utilities

WARREN WRIGHT

Public versus Private Utilities in Massachusetts

CHARLES H. PORTER

The public utility system of

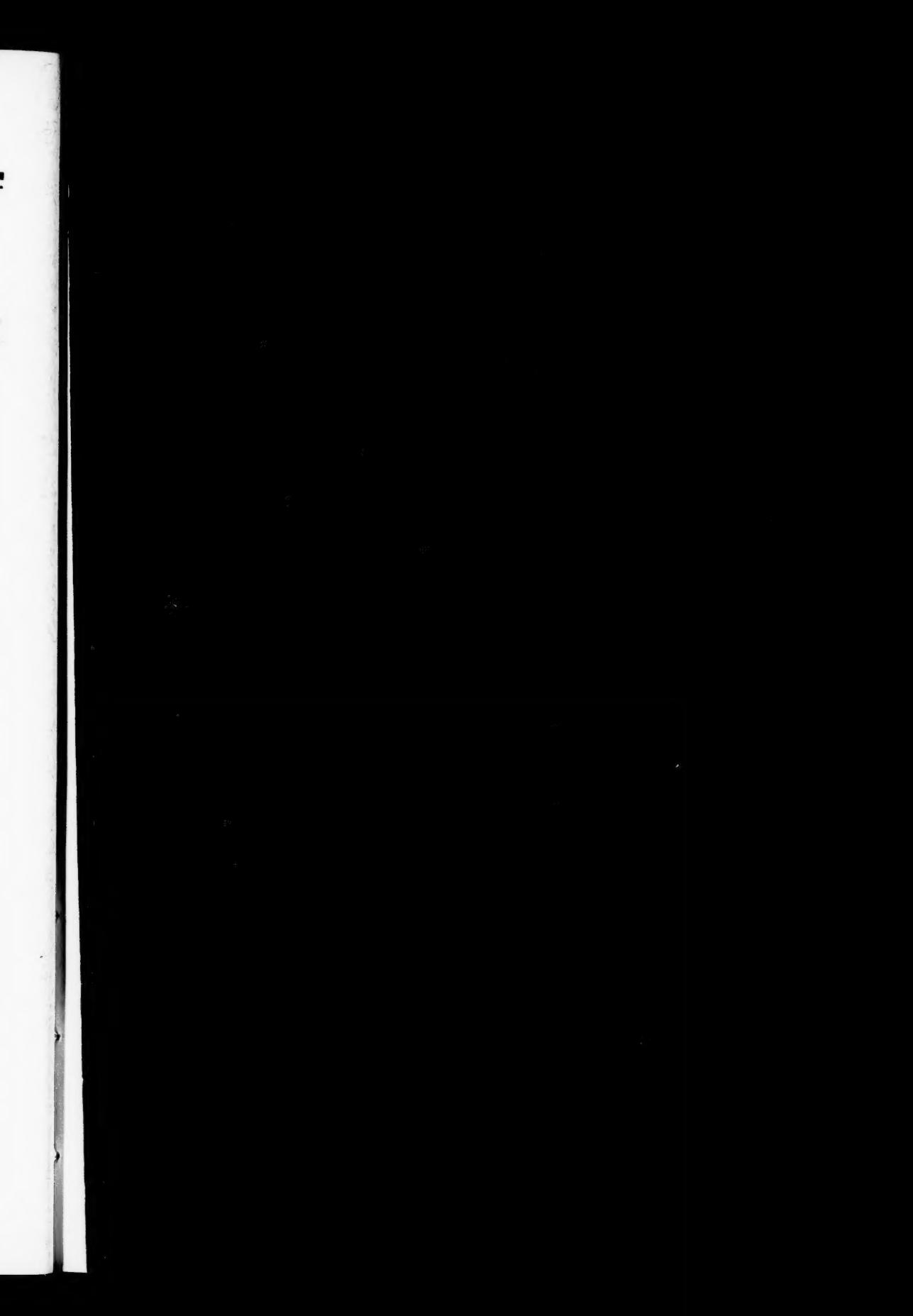
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The contents of the *Journal* are indexed in the *Industrial Arts Index*.

Entered as second-class matter, January 5, 1925, at the post-office at Chicago, Illinois, under the Act of Congress of March 3, 1879. Acceptance for mailing at special rate of postage provided for in section 1103, Act of October 3, 1917, authorized October 12, 1922. Printed in the United States of America.

Subscription Rates: \$5 a year; \$1.25 a copy. Remittances may be made by personal checks, drafts,

post-office or express money orders, payable to the Institute for Economic Research, Chicago, Ill.

Agents of the *Journal* in Great Britain, B. F. Stevens & Brown, Ltd., 28-30 Little Russell St., British Museum, London, W. C. 1.

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Editorial and Business Corre-
spondence: Letters regarding editorial matters should be addressed to the Editor, Northwestern University, 337 E. Chicago Ave., Chicago, Illinois. Letters concerning subscriptions or advertising should be addressed to the Business Manager of the *Journal*, Northwestern University, 337 E. Chicago Ave., Chicago, Illinois. Advertising rates furnished on application.

PUBLISHED QUARTERLY BY THE INSTITUTE FOR ECONOMIC RESEARCH
(FORMERLY INSTITUTE FOR RESEARCH IN LAND ECONOMICS AND PUBLIC UTILITIES)
337 E. CHICAGO AVE., CHICAGO, ILL.

THE JOURNAL OF
LAND & PUBLIC UTILITY ECONOMICS

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THE JOURNAL OF LAND & PUBLIC UTILITY ECONOMICS

NOVEMBER
1931

VOLUME VII
NUMBER 4



The Economics of Municipal Airports

By ERNEST P. GOODRICH

THIS is an endeavor to evaluate the assets and liabilities of an airport for any appropriate community.

Based on statistical data secured for a large number of existing airports, entirely ignoring such variations as differences in size, distance from the community center, amount and kind of improvements, and business done, certain average cost figures have been computed which can be set up in the liability column. The items on that side of a hypothetical ledger would include: cost of land, clearing, grading, drainage, hangars and other buildings, lighting, capitalized annual costs of amortization, maintenance, administration, loss of taxes, insurance, depreciation, and other items. The items on the asset side of the ledger include community advertisement, savings in time by potential air travelers and shippers, and by those who desire to learn to fly and who fly for sport or otherwise in their own planes.

In studying the asset items it is tacitly assumed that no community will establish an airport or even an emergency

landing field unless it feels assured of some use of the facilities provided. Along an established airway, a field may be expected to afford emergency service at least, while it may also provide a terminal for a taxi service for the local inhabitants to a larger regular stopping station on the air route. Communities which are not on an established route will not have as much need of a field for emergency use but the taxi business may be of importance if the community is air-minded. Communities situated still farther from regular air routes may become termini on new routes and meantime may develop some business as a starting point from which to make surveys of any one of many kinds. Other types of fields are those of a suburban location and those for flying schools, manufacturers' testing, and sight-seeing headquarters. Each has its own peculiar needs and a community which contemplates the creation of an airport should carefully consider the various possibilities. Eventually each of these several varieties of flying fields will almost certainly be segregated. In the mean-

time, several uses can be combined in order to secure additional revenues.

Analysis of Cost

Land Cost. Analyses of the cost of nearly 50 airports show that the land costs practically twice as much as all other costs combined. As a very general rule it may be stated that the larger a community, the greater will be the business which is to be expected at its airport, and the larger will be the area required. While the actual developed acreage at 25 ports which were analyzed varied widely, a trend was discovered which can be measured by the formula:

Area in acres equals 50 times the logarithm to base 10 of the population divided by 100.

This gives 100 acres for a population of 10,000
150 acres for a population of 100,000
200 acres for a population of 1,000,000

The actual figures ran from a minimum of 39 to a maximum of 845 acres with an average of 224 when the extremes are included, or an average of 203 acres without them.

The median was 160 acres. Researches by many investigators show that real estate values vary as some fractional power of the population for any given distance from the center of a community, and also that the value decreases with such distance. Practical considerations have dictated the locations of the flying fields of 80 cities at about 20 minutes' ride from the center. The actual distances vary from one to 21 miles. Long distances usually militate against the success of an airport, except in the cases of large cities. An approximate and very general formula for the average cost per acre is as follows:

Average cost per acre in dollars equals one-half the population raised to the $\frac{1}{6}$ th power.

This gives \$1.120 per acre for a population of 1,000,000
\$.267 per acre for a population of 100,000
\$.63 per acre for a population of 10,000

Actual figures ranged from \$50 to \$2,649; the average per acre was \$975 and the median was \$500 per acre.

Some indication of the total cost for land may be secured by combining the figures in the two tabulations. Thus:

Population	Acres	Cost per Acre	Total Land Cost
10,000	100	\$.63	\$ 6,300
100,000	150	\$.267	\$ 40,950
1,000,000	200	\$ 1.120	\$224,000

Land Preparation. The capital costs involved in clearing, grading, and drainage again vary widely. In 10 municipal airports for which complete data are available the range in cost per acre was from \$58 to over \$10,000, with an average of \$810. If the very exceptional high figure is omitted, the average becomes \$430. Combining this average figure with the land cost items gives the following approximate unit expenditures for sites, cleared, graded and drained:

\$.493 per acre for communities of 10,000 population
\$.697 per acre for communities of 100,000 population
\$1,550 per acre for communities of 1,000,000 population

Buildings and Lighting. The costs of buildings and such port adjuncts as night lighting again vary widely. In general, the larger the community the greater the expenditure, largely because of a larger business.

The lighting equipment required by a port does not vary much, being slightly more for a large than for a small field. The range is from \$15,000 to \$20,000. Many ports, especially the smaller ones, have not prepared themselves for night flying. The cost of installing the minimum requirements, such as marker, wind cone, and a small office, may be as little as \$1,000, while one airport with a complete complement of hangars and other buildings has expended nearly \$1,000,000. An average of about \$150,000 has been expended for buildings by all interests, i. e., tenants and owners, on about 50 fields. This is equal to about \$750 per acre for the average field of 200 acres and is seen to be about half the improved land cost per acre of a port for a community of 1,000,000 population.

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Total Capital or Fixed Cost. This ratio is believed to be fairly logical and legitimate and has been used in compiling the following figures:

Popu- lation	Total Unit Costs Per Acre					
	Land	Improve- ments	Struc- tures	Total	Acre- age	Total Cost
10,000	\$ 63	\$430	\$250	743	100	\$ 74,300
100,000	\$ 267	\$430	\$350	\$1,047	150	\$157,350
1,000,000	\$ 1,120	\$430	\$750	\$2,300	200	\$460,000

These are conservative, average, initial, capital expenditure estimates.

The Department of Commerce estimates the average actual expenditures per port on all airports in the country at \$100,000. The averaged costs of commercial and private airports in cities of different size classes are reported as follows:¹

Population	Average Total Fixed Cost per Port
Over 500,000.....	\$491,611
100,000 to 500,000.....	169,243
50,000 to 100,000.....	288,750
25,000 to 50,000.....	47,431
5,000 to 25,000.....	63,788
Under 5,000.....	15,172

These figures are somewhat erratic, but compare surprisingly well with the estimates made above. The reported costs of municipal ports are less for smaller cities and more for larger ones. It should be noted in this connection that the average airport aggregates 190 acres. The statistics show that all ports in three states averaged over 440 acres for their 17 ports.

Current Expenses. The first of the annual costs is interest on the investment, which should be considered whether the funds for acquiring and developing the port are borrowed or donated. If the funds are borrowed, the interest must be earned by port operations or paid from

taxes (in the case of municipal fields), while in the second case the donations have doubtless been made because the donors expected an indirect return on the gift from increased business directly or indirectly developed by the port.

On the other hand, an amortization charge is simply payment for one method of financing. In the case of private corporations, no one expects the capital to be repaid (except in the cases of mines and oil wells which become depleted). In connection with municipal projects the taxpayers should expect to pay amortization charges on borrowed money out of general taxes or else forego the equivalent amount out of the legitimate interest return on the investment. If the adopted policy is one of deferring all interest return or of putting its equivalent back into the project either directly by added annual expenditures, or indirectly through reduced rental and other charges so decreased because of a hope that such lowered rents and charges will tend to create business on which a greater future return may be collected at an earlier date; if these policies are deliberately adopted then interest and/or amortization costs may be balanced on the ledger by equal items entered in the opposite column, but such double entry should always be made so as at all times to show correctly the annual costs.

The item of loss in taxes is one which is often ignored, but is nevertheless a very real one. A 2% tax return on a private investment in an airport costing \$100,000 is evidently \$2,000 per year, which might be secured were a real demand for a flying field to be met by private initiative. If a municipality builds an airport where an insufficient demand exists for a private one, the community is probably being improvident or is acting from a motive of false pride. If a real demand exists and the citizens feel that

¹ *Air Commerce Bulletin*, Vol. 2, No. 15, February 2, 1931.

municipal ownership is desirable for any reason, then a municipal port is a legitimate enterprise, but certainly an indirect potential loss in taxes is likely to occur on at least the costs of land, improvements, and structures. There is, however, a possible balancing item which is worthy of consideration. That is the enhancement in the surrounding land values which has taken place around about half the airports so far constructed. It should be understood that this added land value is not to be expected unless the field is an active one and attracts manufacturers and flying schools which require rather extensive land areas. On the average it is probably not far wrong to assume that loss in taxes can be offset in the long run by enhancement in value of other lands caused by the airport and its activities.²

Obsolescence is generally included with maintenance. When the port is new, the maintenance item is usually small. Furthermore, not all products of capital expenditures require any maintenance. In fact, the land will increase in value as the community increases in population and at about the rate disclosed by the average values per acre already given in the original purchase prices quoted above. When the population has doubled four times, the land value will have doubled about three times.

Administration and operation costs should vary with the use of the airport. Small fields with little business may be able to get along with an expenditure of about \$5,000 per year for such items. On the other hand, a large field may have an expense of \$50,000 for administration and operation. The single item of night lighting entails an operating cost of about \$15,000 per year. A comparison

of these figures with the estimated total capital outlay for ports of different sizes shows approximately 10% as the annual operating cost.

The item of insurance can be estimated at 2½% on the cost of the buildings or about 1% per annum on the entire capital cost. The average insurance cost for 28 hangars for which data were obtained was 3.435%, ranging from 0.347 to 5.280%, depending on construction, hazard, and protection.

From these several computations and under the conditions assumed, the annual expenses of an airport are seen to amount to from 15 to 20% of its total fixed cost, or:

\$11,145	for a population of 10,000
\$27,536	for a population of 100,000
\$92,000	for a population of 1,000,000

Analysis of Income

The question now arises as to what direct and indirect income is to be derived by any community from an airport.

Direct Income. Several sources of direct income exist. They include the following possibilities: (1) land leased for hangars constructed by others; (2) rental of space outdoors and in municipally built hangars; (3) gasoline and oil taxes; (4) landing fees for private planes; (5) taxes or commissions on passenger fares, and from express and mail starting from and arriving at the airport; (6) taxes or commissions on spare parts and machines sold at the field; (7) concessions to store, restaurant and hotel keepers located on the field; (8) vending slot machines (including toilets); (9) automobile parking fees; (10) admissions to the field during air meets and arrivals of celebrities; (11) time of mechanics lent to plane owners.

Land leases are generally figured at the start at about 10 to 20% of the actual average cost per acre of improved land.

² Hubbard, McClintock and Williams, *Airports, Their Location, Administration and Legal Basis* (Cambridge: Harvard University Press, 1930), Appendix 22.

When the municipality erects hangars, the basic annual rental rate is variously figured. It is generally graded with the space occupied by planes of different sizes and a reduction is made for weekly, monthly or yearly leases, below the overnight charge for a plane. The charge for "pegging down" a plane out-of-doors is usually from \$1.00 to \$5.00 per day or night.

Only a few fields collect a gas or oil tax. This is sometimes done by buying and selling the gas and oil, sometimes through selling concessions for the sale of those commodities, and sometimes by an assessment against the private gas companies, of so much per gallon actually sold.

Landing fees are seldom charged against regular users of the field, such as mail carriers, who rent hangar space, but such charges are common against private planes.

A common practice is a contract that regular lines pay so much per passenger and per pound of mail and express handled over the field. Heavier proportional charges are made against planes which take up sight-seers, and against flying schools.

Just as a percentage of the income for the sale of gas is collected, so also charges are made on a percentage basis for spare parts or planes sold at the field by concessionnaires.

Hotel and news-stand operators, restauranteurs and others caring for the public are required to pay the municipality a part of their gross (or net) returns.

At some fields vending slot machines make a good return, especially at times when large crowds assemble at the field.

Most municipal fields make no charge for the parking of automobiles but most commercial fields secure large returns from such fees. The same is true as to admissions on Sundays, holidays, and

during air meets and in connection with the ceremonies incident to the arrival and departure of persons of note.

If the municipality enters the business of supplying mechanics, cleaners, laborers, and other assistants, the usual practice is to charge the plane owner at a higher rate than that paid to the men.

Some fields which have been equipped for night flying make a charge for the turning on of the lights at night for each plane which lands at that time.

The outcome of all these direct charges is that only a very few municipal fields have secured enough revenue to cover much more than operating expenses, and the only profitable fields are those large ones which have a considerable traffic.

As a result of an appraisal of the foregoing items, it may be assumed for purposes of rough estimating that the income may average about 10 cents per capita of the community near which an airport is located. Comparison of this figure with the table of expenses gives the following results:

Popula- tion	Gross Expenses (Estimated)	Revenue	Deficit	Profit
10,000	\$11,145	\$ 1,000	\$10,000	.....
100,000	\$27,536	\$ 10,000	\$17,536	.....
1,000,000	\$92,000	\$100,000	.....	\$8,000

In other words, an airport under present conditions may be expected to cost a community annually in direct net expense as much as \$1.00 per capita for small ports which are, however, fairly well built and equipped, down to nothing in the case of large, well operated, busy ports adjacent to large cities.

Indirect Income. The question then arises whether any indirect return can be considered as offsetting this deficit. Such indirect returns include the following items: (1) municipal advertising; (2) sight-seeing opportunities for citizens; (3) savings to citizens through the use of the air facilities available.

Several communities have undertaken general advertising campaigns. Such places are usually of the resort variety or else are desirous of securing new industries. The appropriations for such advertising have almost always been made by the business men. Five cents per capita per year may be taken as the maximum figure which is considered worth while for such purposes.

During the early period of airport construction and use its novelty always attracts sight-seers—sometimes in large numbers. Reports from a number of flying fields vary widely; larger proportions of the population of small than of large communities visit the field annually. The equivalent of the whole population of cities up to 100,000 may be expected to visit an airport each year and this total figure may perhaps be doubled for the largest ports. An outlay of five cents per capita per annum may be assumed as a maximum value to place on this sight-seeing element. A fair estimate may thus be secured.

The advantage for business reasons to the merchant and banker of a near-by flying field may at times be very great.

The amount of the benefit to the community will depend on the number of persons who use the air facilities and the average value of the individual benefit derived. The amount of the latter will depend on the type of flying employed, such as air mail, air express, or air travel. An air mail letter may be considered to be worth an average of 10 cents extra. The increase in the air mail business during the past few years seems to indicate a per capita value of \$1.00 about three decades hence. Air express may be similarly estimated to amount to about \$5.00 per capita by the same date. Using the same per capita method of estimating air passenger travel, together with the assumption which has been

found to hold true with reference to such items as per capita automobile ownership and per capita telephone connections, it is estimated that the average number of revenue passengers carried by regular lines in 1930 was 0.15% of the population of the country and that this number will increase at least seven times during the next 30 years. These figures are averages for the whole country, including the negroes in the south, the farmers in New England, the mountainers, and others. In any community in which an airport is likely to be contemplated, the ratio will be much higher and has been assumed herein as 1/250th of a ride per capita per year for such communities at the present time and 1/30th of a ride per capita 30 years hence. The fixing of a value per ride is exceedingly speculative, but has been assumed herein at \$100 per ride. These figures, when translated into values per annum to any community, equal \$0.40 per capita today and \$3.20 per capita 30 years hence.

The approximate annual per capita intangible assets of an airport may be recapitulated as follows:

Item	1930	1960
Advertising value.....	\$.05	\$.05
Amusement value.....	.05	.05
Air mail.....	.08	1.00
Air express.....	.50	5.00
Air travel.....	.40	3.20
Total.....	<u>\$1.08</u>	<u>\$9.30</u>

On their face, these figures seem to indicate that a \$10,000 operating deficit incident to a good airport contiguous to a progressive community of 10,000 population would be just about offset by the intangible assets which should accrue.

These latter very approximate and highly speculative estimates may be assumed to indicate a general conclusion that airports should prove themselves of value to progressive communities even if they are as small as 10,000 population.

Judicial Supervision of Commission Regulation: A Study of Court and Commission Relations in Massachusetts*

By MARY LOUISE RAMSEY

THIS article, which is the second of two dealing with regulation in Massachusetts, will continue analysis of public utility cases on contracts, certificates of convenience and necessity, and security issues and conclude with an evaluation of the effect of the courts upon the regulatory efforts of the various commissions concerned with public utilities in Massachusetts.

Contracts

Two cases have involved the Commission's power to approve contracts or leases. In one the Commission's order was approved, in one reversed. In *Hampton Railroad v. Boston and Maine Railroad*,⁴⁹ the Court held that there could be no suit on a contract to make a lease on specified terms subject to the approval of the Public Service Commission. No lease could be effective until the Public Service Commission had approved it and to permit assumption of liability for an unapproved contract to make a lease would be an evasion of the statute which the Court could not sanction.

The other contract case was *Boston Consolidated Gas Company v. Department of Public Utilities*.⁵⁰ The statute incorporating the Boston Consolidated Gas Company provided that it should not purchase any gas until the Board found that the purchase price was less than the cost to the Company to manu-

facture the gas itself. With the approval of the Board the Company contracted in 1917 to purchase gas from the New England Fuel Company. This contract provided for the adjustment of prices under conditions named. After the World War a new contract increasing the price was drawn up, but the Board disapproved. Thereafter the price was increased under the terms of the existing contract. Although finding that this increased price was less than the price at which the Boston Gas Company could manufacture its own gas, the Board withheld approval, claiming a discretion to look to the fairness of the contract generally. The Court held that the statute did not give the Board unqualified power to fix a price for gas which it considered just and reasonable. Since it had originally approved the terms of the contract which authorized this increase, and since it admitted that the new price was less than the cost of manufacture for the Boston Consolidated Company, the new price was valid without further approval.

Since there is no similar provision in the general statutes, this decision is significant only for this particular Company.

Certificates of Convenience and Necessity

One recent case involved the Department's power in the matter of certificates

*The first installment of this article which appeared in the August issue (*7 Journal of Land & Public Utility Economics* 225-236) analyzed public utility cases involving locations, miscellaneous problems, rates, and

service. Footnotes are numbered consecutively with those in the first article.

⁴⁹ 233 Mass. 411 (1919).

⁵⁰ 235 Mass. 590 (1920).

of convenience and necessity, *Roberto v. Department of Public Utilities*.⁵¹ The statute⁵² forbade the operation of motor vehicles for hire without a certificate of convenience and necessity from the Department of Public Utilities and authorized the Department to specify the routes of operation and to "attach to said rights such terms and conditions as the Department shall deem the public convenience and necessity shall require." Revocation of a certificate for cause was authorized. Plaintiff was granted a certificate specifying a given route and subject to limitations as to the areas in which he could admit and discharge passengers. When plaintiff violated these conditions by admitting and discharging passengers at prohibited points, his certificate was revoked.

Upon appeal the Court affirmed the Department's order in a short opinion from which the following is quoted:

"The commonwealth has power to prescribe the conditions under which public ways may be used by motor vehicles and can delegate the administration of such powers to cities and towns and to the Department of Public Utilities . . . The Commissioners could consider all the conditions of public travel within the limits described in the certificate and could consider and attach such terms and conditions as in their discretion public convenience and necessity require. The petitioner has failed to maintain the contention that the restrictions were unlawfully imposed . . . The petitioner accepted a valid certificate which contained a condition of revocation if he failed

⁵¹ 262 Mass. 583 (1928).

⁵² Chapter 159, section 48a of Gen. Laws as added by Statutes 1925, c. 280, section 2.

⁵³ The theory referred to is the idea of the Department that the application of valuation principles enunciated by the Supreme Court of the United States might be avoided in Massachusetts by the passage of a statute providing that the acceptance of privileges therein conferred—such as the continued right to exercise the power of eminent domain, the power to issue additional securities in the future, the privilege of capitalizing all or part of its surplus account, under certain conditions, and the right to have a municipality entering into a

to comply with its terms. The certificate was a privilege. *It was neither a contract nor property and its revocation deprived the petitioner of no vested rights.*"

Neither the statute nor the decision in terms place any limit on the Board's authority to impose, through the certificate of convenience and necessity, any condition which it believes public welfare requires. If that were true, the Court would have no power to review the Board's action and its affirmance of the order would not imply any measure of approval of the policy. Usually there is an implied condition that the Board's discretion must be exercised reasonably; if used unreasonably, the Court will reverse the action. In such cases the affirmance of an order by the Court at least signifies that the Court does not consider the policy so clearly unreasonable as to warrant reversal.

The point of greatest interest is the possible implications of the statement that such a certificate is a privilege and that since this provision for revocation for violation of its terms was contained therein, therefore the petitioner was deprived of no vested rights. Could that mean that such conditions are subject to no limitations of reasonableness and that therefore their reasonableness or unreasonableness is not subject to review? If so, how would that affect the Department's contract theory?⁵⁴ The right to engage in any public utility business is now considered a privilege which may be denied.⁵⁴ Can existing utility franchises

similar business, purchase its plant at a fair value—would affect a contract consenting to any regulation of rates which the Department might order, so long as the utility was allowed sufficient earnings to pay dividends large enough to keep the market price of its stock at or above par. The Legislature defeated the bill embodying these provisions on the ground that it was unconstitutional because it sought to coerce the utilities to enter such a contract. See *Report of the Department of Public Utilities*, 1927, p. 8.

⁵⁴ *Frost v. Corporation Commission*, 278 U. S. 515 (1929).

be considered mere permits which may be revoked for cause? Can any conditions be attached to the granting of the privilege without review as to reasonableness? If so, is the permission given to an existing company to make a capital readjustment or to increase its stocks and bonds, or take property by eminent domain, or to require the purchase of its plant by a municipality proposing to engage in the same business, the granting of such a privilege as to invoke the doctrine? (It might be noted parenthetically that the Roberto case says that this is not a matter of contract or property, while the Department uses the term "contract." However, in each case the condition goes with the grant of privilege and acceptance of the privilege makes the condition operative without further consent.)⁵⁵

On these questions we can only speculate; the Court's meaning is not entirely clear, and furthermore the last word will lie with the Federal Courts.

Security Issues

Five cases involved security issues. Two decisions were favorable to the Commission, two unfavorable, and in the fifth the Court agreed with the Board in a limited construction of its powers.

*Brown v. Boston and Maine Railroad*⁵⁶ involved a special act which provided for the reorganization of the Boston and Maine Railroad, and which authorized the issuance of new securities to refund lawful debts. The Public Service Commission approved the issue of \$12,000,000 par value of stock to retire existing debts; the minority stockholders objected on the ground that the debts to be retired were not valid. The Public Service Commission had found the debts

⁵⁵ There has been little controversy over the constitutionality of such a contract bill as applied to companies which might be organized after its passage. The Board, in its recommendation of December 14, 1928, assumes the constitutionality of such measure, and its conclusions seem to be justified by the instant case.

to be legal. The Court agreed with the finding and affirmed the order.

In the case of *Boston and Albany Railroad v. New York Central Railroad*,⁵⁷ the New York Central had leased the Boston and Albany for 99 years in 1899. In 1923 it sought approval for \$3,000,000 of bonds to be issued by the Boston and Albany to compensate for alleged permanent improvements upon the leased property. The controversy here was between the stockholders of the lessee who were objecting to the issue and the lessor who was insisting upon the issue under the terms of the lease. The question involved was a construction of those provisions of the lease which related to the bond issue. After making allowances for improvements and depreciation, the Board approved an issue of \$1,500,000 worth of bonds. The Court agreed in interpreting the lease to permit an issue of bonds; also that the deduction of depreciation was proper in determining the amount of bonds properly issuable. It refused to review the Department's computations of the amount to be approved, saying that such computations were based on fact and the Court could only review questions of law.

*Childs v. Krey*⁵⁸ was a suit on a contract between private parties—purchaser and seller of the entire capital stock of a public utility company. The issue involved was legality of the payment of \$2,400 in dividends between 1903 and 1907. In 1903 the Board had approved an issue of 200 shares of stock of this company, the proceeds of 50 shares to be applied to the cancellation of outstanding promissory notes and the proceeds of the remaining 150 shares to be applied to new construction. As a part of this order the Board forbade the company to

⁵⁶ 233 Mass. 502 (1919).

⁵⁷ 256 Mass. 600 (1926).

⁵⁸ 199 Mass. 352 (1908).

declare any dividends until \$3,500 of its promissory notes had been cancelled out of income; the reason for the order was that the value of the company's property did not equal its capitalization. The company took no steps to issue the new shares and continued to pay dividends on the old stock. The plaintiff contended that the order respecting the payment of dividends was independent, and therefore the payment of this \$2,400 in dividends was illegal, and that amount should be restored to the company's treasury. The Court held otherwise:

"Chapter 109, Revised Laws Section 26 does not give the Board power to enter an independent order directing an impairment of capital stock to be made good. The section in terms provides: 'If, when the Board of Gas and Electric Light Commissioners approves an issue of new stock or bonds, it determines that the fair structural value of the plant is less than its outstanding stock and debt, it may require the impairment of capital stock to be made good.' The object of the act manifestly was to enable the Board to see to it that the old stock, for example, was worth par before new stock to be issued at par was approved.

"This construction of the statute has been adopted by the Board in the case of the electric light company now in question. The order for the issue of the new stock was made in June, 1903. On the 30th day of the same month a dividend of 1½% was declared and paid and dividends of 3% were declared and paid in December of that year and in June, 1904 and June, 1907 dividends of 3½% were declared and paid. The company reported to the Board each and all of these dividends. No objection to this course was made by the Board, manifestly because it considered that this order (as it had to be) was a part of the approval of the issue of new stock, and that the project of issuing new stock had been abandoned by the company."

As the opinion discloses, there was no conflict between the Board and the Court. The Legislature, not the Court, was responsible for these narrowed boundaries of the Board's authority.

The most important of these cases is *Fall River Gas Works v. Board of Gas and Electric Light Commissioners*.⁵⁹ In 1912 the Fall River Gas Works Company applied for the approval of an issue of 1,150 shares of additional capital stock of a par value of \$100 each, at a price of \$225 per share, for the payment of obligations incurred for construction and for future additions to the plant. The total amount thus to be raised was \$258,750. On December 31, 1911 it had outstanding promissory notes amounting to \$200,000. To the payment of these notes and to the proposed subsequent expenditures of about \$40,000 for new plant the proceeds of the stock issue were to be applied. The Company's earnings during the period, after payment of the regular dividends of 10% prior to June 30, 1908 and later 12% annually thereafter would have been sufficient to cover the notes outstanding if they had been so applied. However, the Company had paid out \$241,500 in two extra dividends, one of 20% in July, 1907, and one of 15% in December, 1910.

Between June 30, 1904 and December 31, 1911, the Company's total expenditures for additions to plant were \$409,045; of this amount \$154,192 was expended prior to June 30, 1906. In October and November, 1906, after approval by the Board, new stock to the amount of \$101,750 was issued cancelling an equal amount of notes. Notes outstanding June 30, 1906 were \$217,000, an excess of \$115,250 over the stock issue. The expenditures for additions after June 30, 1906 were \$307,295. Net earnings during the period covered by these plant expenditures amounted to \$1,085,763. The regular dividends required \$552,050, leaving net earnings above such dividends \$533,713, which

⁵⁹ 214 Mass. 529 (1913).

exceeded by \$226,418 the cost of additions to the plant after applying thereto the proceeds of the stock approved in 1906. About \$222,500 of these earnings were applied to such additions, but instead of using the remainder to cancel notes outstanding, it was used for payment of the extra dividends mentioned and for about \$60,000 in interest and minor charges.

The Board's report makes no definite statement as to when these notes were issued, but apparently they were issued for new construction from time to time during the same period when the excess earnings were being accumulated. Upon this state of facts the Board denied the application, saying:

"The notes payable at the close of the year 1911 were within \$40,000 of the amount required for the extra dividends described and the conclusion seems irresistible that but for the declaration and payment of these extra dividends these notes would not now exist.

"Section 20, Chapter 109, of the Revised Laws provides that no gas light company 'shall declare any stock, scrip dividend or divide the proceeds of stock or scrip among stockholders.' If the outstanding notes were issued for the express purpose of providing for these dividends, to issue stock for their payment would be a plain violation of this provision. Where net earnings are of such volume that they may readily provide the funds for all needed additions to the plant, but the company, rather than so apply them, divides all these earnings among its stockholders and provides for additions by outstanding loans to be hereafter capitalized, the prohibition of the statute may perhaps be avoided. But by persistent pursuit of such methods it is obvious with the maintenance of prices necessary to produce such earnings the company may not only compel the public to contribute all the additional investment required for the business, but also may have this contribution permanently represented by capital stock. Such a course, in the judgment of the Board, is not only contrary to the public interest, but even if it be not an actual evasion of the law cited, is a clear violation of its spirit, and of the policy it is intended to declare."

The Board apparently considered that the public who had paid in this surplus had an equitable interest therein which would be encroached upon if the Company were permitted to capitalize it directly or indirectly. From the order of the Board denying approval of the issue, the Company appealed.

The Court pointed out that the Board did not question the propriety or reasonable necessity of the additions to the plant, either those that had been made, or those planned for the future, or that the amount expended and to be expended thereafter represented their cost and real value. Section 24, Chapter 109 of the Revised Laws provided that gas and electric companies might issue such amount of stocks and bonds as the Board of Gas and Electric Light Commissioners find "reasonably necessary for the purpose for which such issue of stock or bonds has been authorized."

The argument turned on the point as to whether the Board had "jurisdiction to determine not only whether or not the amount to be raised by an issue of stock was reasonably necessary for the purposes indicated, but also whether the issue itself was reasonably necessary therefore."

In determining the question the Court unequivocally denied the Board's suggestion that the public had an equitable interest in this surplus:

"When the corporation has performed all its duties and by its fortunate situation, good management, or any lawful conduct, has remaining a surplus of earnings, it has a right to distribute this surplus among its stockholders in dividends. *As between the public and the corporation the earnings belong to the corporation . . . The relations between a public service corporation and the public to serve whom it was chartered, are not that of a partnership, but rather that of individual contracting parties.* The public may demand proper service and with that demand the corporation must comply. The company may de-

mand fair compensation for this service, and with this demand the public should comply. *The corporation can have no share in the benefit to the public nor can the public have any share in the net profits available for dividends.*

"Upon the question whether there shall be an issue of additional capital stock to meet the liabilities incurred in increasing the efficiency and value of the plant, the amount of undivided profits on hand at the time the liabilities were incurred or the expenditure made which thereafterwards and before the application to the Board have been lawfully distributed as dividends is entirely immaterial . . .

"Nor is this proposed increase a violation of the statutory prohibition against the issue of a stock dividend. It certainly is not in form such an issue. Nor is it in substance. The sum raised goes to increase the value of the plant for the purpose of the business for which the petitioner was incorporated, and that is none the less true even if these expenses could have been paid out of the funds since lawfully distributed as dividends."

This is the one decision of the State Court which threatened interference with an important settled policy of the Board, and its effect was obviated by the addition of a clause in Section 39, Chapter 742 of the acts of 1914 reading:

"The Board may take into consideration any resources of the company available, or which might have been available for such purpose."

With respect to the general policy regarding reinvested surplus two questions suggest themselves: (1) whether the Massachusetts Board had previously applied this policy and if so to what extent; (2) what policy had been adopted in other jurisdictions at this time?

⁶⁰ *Edison Electric Illuminating Company of Fall River*, 11th Annual Report, Board of G. & E. L. Commissioners 20 (1896); *Malden & Melrose Light Company*, 11th Annual Report, Board of G. & E. L. Commissioners 29 (1896); *Haverhill Gas Securities Company*, 15th Annual Report, Board of G. & E. L. Commissioners 6 (1900); *Haverhill Gas Light Company*, 16th Annual Report, Board of G. & E. L. Commissioners 9 (1901); *Haverhill Gas Company*, 27th Annual Report, Board of G. & E. L. Commissioners 79 (1911).

Answering the first, there were five prior cases in which the Board had refused approval of all or a part of the proposed issue because the amount could be or could have been covered by reinvested earnings.⁶¹

As to the policy of other jurisdictions the statutes of nine states either expressly,⁶² or as interpreted by their courts or commissions shortly thereafter,⁶³ permitted stock dividends, thus recognizing the right of stockholders to such surplus rather than any right of the public therein. Three other jurisdictions forbade stock dividends directly,⁶⁴ but their commissions or courts had not passed on the situation here presented at the time of this case; the New Hampshire Court later permitted another form of evasion.⁶⁵

A later case in which the Commission was reversed on an order relating to security issues was *Bulkeley v. New York, New Haven and Hartford Railroad*.⁶⁶ The Board had approved an issue of convertible debentures and an issue of stock to protect the conversion privilege. This order was made in 1913 at the time when the New Haven was trying to recover from the disastrous financing of the Mellen regime. Apparently the Department was catering to financial fashions in order to make the issue as salable as possible.

Certain stockholders of the New Haven sued to annul this order on the ground that the Commission had no

⁶¹ Kansas, Laws 1911, c. 238, §35; Maine, Laws 1913, c. 120, §§35, 37; Ohio, Acts of 1911, p. 567, §§614-58; Missouri, Laws 1913, pp. 595, 613, 614; Wisconsin, Laws 1913, c. 598; West Virginia, Laws 1913, §2958.

⁶² P. U. R. 1915 C 324 (Cal.); P. U. R. A 205 (Ill.); P. U. R. A 540 (Ind.); P. U. R. E 72 (N. J.).

⁶³ Illinois, Ann. Stat. 1913, §§756 (Railroads); New Hampshire, Laws of 1901, c. 273, §11; South Carolina, Civil Code, 1913, §2889.

⁶⁴ *Grafton County Electric Light & Power Co. v. State*, 94 Atl. 193 (1915).

⁶⁵ 216 Mass. 432 (1914).

authority to approve such a convertible issue. The Court upheld the contention:

"The decision of the Commission as to the amount of stock to be issued . . . is required to be based on the price at which the stock is to be issued, with a further requirement that its approval shall be withheld if in its opinion the price at which it is proposed to be issued 'is so low as to be inconsistent with the public interest'. It is difficult to define the phrase last quoted. It is not now necessary to undertake to give a comprehensive statement of its significance . . . At least it must be taken, as was said by the Railroad Commissioners in their 40th Annual Report, pages 15 to 155, 'to mean in any specific case an issue price materially lower than the price which would assure a ready market for the issue.'

The approval by the Commission of an issue of stock must relate to the present and not to a remote future. This . . . is necessary in order to make the statute of 1913 reasonably effective in the accomplishment of practical results . . . The amount of stock which a Commission intelligently can approve . . . is inseparable from the price at which it is to be issued. The price at which the public interest may require that it be issued during a period of ten years beginning five years hence is impossible of ascertainment now . . . An order entered now that the stock be issued at par during that period can afford no security that the corporation will get an adequate return for its stock or that rates and charges fixed upon such a capitalization will be fair or that the rights of their stockholders will be guarded properly. The mandatory requirements of this statute that the Commission shall base its decision as to the amount of stock issued upon the price at which it is to be put out is inconsistent with the underlying idea of a convertible bond such as is proposed in the present proceeding. It has been argued with earnestness that a convertible debenture has become highly desirable in view of present conditions. This fact is a matter rather for legislative than for judicial consideration."

⁶⁶ To make the picture complete it should be stated that holding companies having stock in Massachusetts operating companies have issued convertible securities. For instance, the Massachusetts Utilities Associates issued a convertible preferred stock in 1929. The International Hydro Electric Company, which has some Mas-

Looking alone to the language of the statute it seems that the Commission's discretion in determining what is "so low as to be inconsistent with the public interest" might well be held to be sufficiently wide to embrace approval of this issue. However, since the Railroad Commissioners themselves had given this language the limited construction quoted above, requiring the issue price to approach the market price as nearly as practicable, this decision of the Court follows naturally enough.⁶⁶

Having reviewed these cases, how shall we answer the questions asked in the beginning?

The following table presents a summary statement of the proportion of reversals to affirmances for the three major periods of regulation:

	Total	Commission Sustained	Commission Reversed	Unclassified
1869-1913.....	22	14	7	1
1914-1920.....	12	7	4	1
1921—date.....	7	6	1	0
	41	27	12	2

Arranged according to the type of cases the figures show:

Type of Case	Total	Commission Sustained	Commission Reversed	Unclassified
Franchises and locations	15	14	1	0
Commission procedure.	2	0	1	1
Rates.....	11*	7	3	1
Service.....	4	2	2	0
Contracts or leases.....	2	1	1	0
Certificate of convenience and necessity.....	1	1	0	0
Security issues.....	5	2	3	0
Miscellaneous.....	1	0	1	0
	41	27	12	2

*Excluding the two appeals to the Federal Courts.

sachusetts holdings through the New England Power Association, has issued convertible debentures. So also has the New England Gas & Electric Co., and its affiliated Associated Gas & Electric Company. See the reports for these companies in Moody's volume on *Public Utilities for 1930*. See also *New York Times*, for June 25, 1931 reporting the plan for acquisition of the North Boston Lighting Properties by the New England Power Association through its subsidiary the Massa-

(Footnote 66 continued on page 350)

In eight of the cases decided against the Commission a utility company was complaining of the action of the Commission; in one the local municipal authorities were objecting; in one an individual patron; in another the minority stockholders of a railroad. In two of the cases where a company was objecting to the Commission's decision the objection was raised in suits by an individual seeking to enforce the Board's order.

A further observation of interest is the fact that 36 of these cases have involved carriers, and only 7, including the two appeals to the Federal District court, have related to gas and electric utilities.

The question, as to whether the court has interpreted the Commission's powers strictly or broadly, and whether it has aided or hindered the Commission in its work, cannot be answered dogmatically. A very good practical test is found in the extent to which the Court has asserted the power to review Commission decisions at all.

The Court has said that it will review the Commission only on questions of law and not of fact. Query: what does the Court mean by that statement, and what policy of review does it purport to follow? If it followed the policy stated in a literal sense, it would, according to the Ben Avon case,⁶⁷ be denying due process of law to the complainants. From the following quotations, taken from the cases in which the Court has made any statement as to the extent of its review, we shall try to decide how much the above statement needs to be amplified:

"We need not decide whether a case might not arise in which this Court could revise the proceeding of these Boards, and that a

(Footnote 66 continued from page 349)
chusetts Light and Power Associates, this plan provided for an issue of common stock by the Massachusetts Association, such stock to be convertible into Class A stock of the International Hydro Electric System between March 1, 1932 and March 1, 1942.

change made by their permission as a relocation was in fact an abandonment of the station. The statute at least gives to them a large discretion to determine whether a proposed change is a relocation or an abandonment, and, upon the facts of the case before us, they were clearly justified in treating the change of stations as a relocation within the statute."⁶⁸

"The statute which authorizes one street railway company to use the tracks of another provided that . . . 'the compensation to be paid therefore shall, if the companies cannot agree, be determined by the Board of Railroad Commissioners' . . . The rate of compensation to be paid is submitted in the broadest terms to the determination of the Commissioners.

"The Commissioners deemed it just and equitable that in determining the compensation to be paid by respondent for use of the petitioner's track, they should have regard for the cost of construction of the road, and should include in this cost the said sum of \$33,000 . . . This was within the discretion entrusted to them by statute. The question whether any other rule would have been more just and equitable was to be decided by the Commissioners and not by this Court. There is nothing to show the mode which they adopted of estimating that the compensation was unreasonable, or that they exceeded the authority given them by statute."⁶⁹

Section 100 of Chapter 112 of the Revised Laws provides that:

"The Supreme Judicial Court or the Superior Court shall have jurisdiction in equity . . . to review, annul, modify or amend the rulings of any state board or commission relative to street railways, as law and justice may require."

Knowlton, C. J.:

"The first question is whether the word 'rulings' means rulings of law or includes findings or decisions upon questions of fact . . . By its ordinary meaning, it is applicable to decisions upon questions of law, and not to findings upon questions of fact . . .

⁶⁷ *Ohio Valley Water Company v. Ben Avon Borough*, 253 U. S. 287 (1920).

⁶⁸ *Attorney General v. Eastern Railroad*, 137 Mass. 45 (1884).

⁶⁹ *Cambridge v. Street Railway*, 139 Mass. 454 (1885).

"A great variety of matters affecting street railway companies are left . . . to the Board of Railway Commissioners . . . ; it would obviate the main purpose of the statute creating this Board if its decisions in all matters of fact were subject to revision and reversal by the Court. We think it plain, therefore, that this section opens to review only rulings of law and it follows that the Superior Court rightly refused to hear evidence to prove a different case from that which appeared at the hearing when the rulings were made . . ."

"The fourth ruling requested of the Board of Railroad Commissioners was that 'evidence of location as granted or made was not consistent with the public interest' and the fifth was that 'it creates in said Washington Street, a public highway and private nuisance.' Both of these propositions involve questions of fact upon which there was ample evidence to sustain the findings of the Board of Railway Commissioners. Upon the evidence it could not be ruled as a matter of law that the extension would constitute a nuisance, and while there were conflicting considerations on the question, whether it would be consistent with the public interest, the facts presented by the petitioners for the approval of the location tended strongly to support the petition."⁷⁰

"The Legislature itself approximately determined the position of the two ends of the viaduct and so far defined its course as to declare that it shall extend by a curved line over Bridge Street, Mechanic Street, and Front Street. Within these limits the location of the tracks and bridges of the viaduct is, in the most explicit terms, submitted to the determination of the Railroad Commissioners. The propriety of the course and direction of the location of the railroad tracks even when entrusted to the judgment of the Railroad Commission itself cannot be revised by this Court except in cases of exceeding the limits prescribed by the Legislature or of bad faith."⁷¹

"These orders and decisions as a whole are not within the jurisdiction of the Public Service Commission under the facts here revealed and ought not to be enforced now. . . . An order baldly directing a carrier to remove a discriminatory rate when the only possible way in which that discriminatory

rate can be removed is by making a substantial reduction in its rates, and where there is no election to raise some rates or reduce others, without at the same time determining what is a reasonable rate, is not an exercise of the jurisdiction conferred."⁷²

"The finding of the rate-making power should always be accorded respect and given every rational presumption in its favor . . . unless it is clear that the rate established by the Public Service Commissioners is reasonably certain to afford less receipts than that proposed by the receiver, he has suffered no injury and hence in equity there would be no reason to revise the report and order of the Public Service Commissioners . . . The power of this Court . . . is confined to dealing with 'rulings or orders of the Commission which are unlawful to the extent only of such unlawfulness.' Manifestly no power to re-hear these facts is conferred by these words. . . . The findings of fact of the Commission are not to be reviewed or revised by the hearing of evidence in a case like the present.

"When constitutional questions are involved, the Court will examine the report of the Public Service Commissioners for the purpose of reaching its own conclusions, not fettering its discretion or judgment by artificial rules as to its weight . . . but attributing to it and to its several parts all the force and effect to which its substance and a consideration of the expert nature of its investigations and conclusions naturally entitle it . . ."⁷³

"The inquiry . . . whether an increase in fares is necessary 'in order to obtain a reasonable compensation for the service rendered,' is primarily a question of fact . . . And the question whether the company shall be permitted to withdraw the commutation tickets called for the exercise of sound discretion and judgment of the Commission, based on the evidence of the company's financial condition, and ability to serve efficiently the public dependent upon the maintenance of its entire system of inter-communication and transportation. We are unable to perceive on the record before us any conclusions of fact, in so far as conclusions of fact are involved, which were unlawful. It is only when ' . . . any rulings or

⁷⁰ *Paine v. Newton St. Ry.*, 192 Mass. 90 (1906).

⁷¹ *Worcester v. Railroad Commissioners*, 113 Mass. 161 (1873).

⁷² *National Dock & Storage Warehouses v. Boston & Maine R.R.*, 227 Mass. 197 (1917).

⁷³ *Donham v. Public Service Commission*, 232 Mass. 309 (1919).

orders of the Commission . . . are unlawful' that this Court in equity can 'annul, modify or amend them' to the extent only of such unlawfulness.'"⁷⁴

"Under existing circumstances . . . the action of the City Council (in revoking the location of a street railway company) is not final, but rests ultimately with the Department of Public Utilities, whose decision upon questions of fact is conclusive. Whether public necessity and convenience in the use of a public way require that the location shall be revoked presents an issue of fact . . .

"The question before the Department under this statute is legislative and not judicial in character, and the judgment of the Department thereon, when exercised in good faith, is not open to review by the Court. . . . As the majority of the members of the Department have found that the approval of the revocation should be denied 'upon general grounds of public necessity and convenience' the finding is not open to review in these proceedings . . . The jurisdiction of the Court is limited to determining whether the decision of the Department contains any erroneous rulings of law. In arriving at the conclusions reached . . . it does not appear that any issue of law was involved."⁷⁵

"The power of this Court under Sec. 27 of that act [Chapter 794 of Statutes of 1913] is confined to dealing with 'rulings or orders of the Commission which are unlawful to the extent only of such unlawfulness.' Manifestly no power to rehear facts is conferred by these words."⁷⁶

"It is not contended as a matter of law that the findings of fact were not warranted by the evidence, and they are not reviewable."⁷⁷

From these quotations it seems that the Court, in saying that it will review only questions of law and not of fact, means that it will not review the Department's conclusions drawn from the facts if such conclusions are supported by the evidence; the Department has no power to act unless guided by evidence; therefore if the evidence does not justify the conclusions and orders made, an er-

ror of law is committed. Obviously such an approach leaves a twilight zone between law and fact. The only real test of the Court's policy in such a matter is found in the cases in which it has reversed the Department or Board. When the Court affirms the orders made, there is always a question as to whether it did so because it agreed with the conclusions of the Board or Department, or because it did not consider the case a proper one for review.

Upon examination of the 11 cases in which the Board or Department was reversed, it seemed clear that eight involved only questions of law, but that in three the factual element was present. These were: *Cambridge v. Board of Railroad Commissioners*; *Bulkeley v. New York, New Haven and Hartford Railroad*; *New England Telephone and Telegraph Company v. Department of Public Utilities*. In the first case the question was whether an order regarding the construction of a bridge came within the statutory "details" over which the Board was given jurisdiction; in the second, whether the approval of an issue of debentures convertible into stock at par violated the statutory prohibition against the issue of securities at a price "so low as to be inconsistent with the public interest"; in the third, whether an order requiring the Company to furnish service under certain conditions constituted an unwarranted invasion of the Company's right of management. It seems reasonably clear that each of these cases fell within the twilight zone and was properly subject to review; whether or not we agree with the conclusions reached in these particular cases, there seems little basis for the charge that the

⁷⁴ *Fall River v. Public Service Commission*, 228 Mass. 575 (1917).

⁷⁵ *Salem v. Eastern Massachusetts Street Railway*, 254 Mass. 42 (1925).

⁷⁶ *Boston & Albany Railroad v. New York Central Railroad*, 256 Mass. 600 (1926).

⁷⁷ *Roberto v. Department of Public Utilities*, 262 Mass. 583 (1928).

Court has materially interfered with the Commission in this respect.

A related question is this: what has the court held to be the nature of the powers exercised by these regulatory tribunals? At various times the Court has referred to them or to their powers as judicial, quasi-judicial, administrative, or legislative. Quotations from the cases are set forth below. Most of them seem to have been thrown in for good measure; there is nothing to indicate that the Court has carefully thought the problem through.

"The Board of Railroad Commissioners is analogous to that of the County Commissioners. It has a sworn clerk whose duty it is to 'keep a full and faithful record of its proceedings' . . . Its duties are not simply ministerial, but to some extent judicial. It may summon witnesses, administer oaths, take testimony, and, after notice to the parties, adjudicate upon certain matters that may be submitted to it . . . While it has no power to enforce its decisions, they may, in certain instances, of which this is one, be made the foundation of equitable proceedings to carry them into effect . . . For these reasons, therefore, that the action of the Commissioners cannot justly be treated as a refusal to prescribe the details of the crossing, and that their order is more in the nature of an erroneous judgment in judicial proceedings than a discharge of purely ministerial functions, we think certiorari is the proper remedy."⁷⁸

"The Commission is a quasi-judicial tribunal. Its power is to approve the issue of the proposed convertible debentures and not merely its amount. When application is made to it for approval it becomes its duty to determine whether as a matter of law it is empowered to approve such an issue as it is approved by the corporation . . ."⁷⁹

Speaking of a petition for certiorari to correct alleged errors of the Board of

Railroad Commissioners in entertaining an application for a certificate of convenience and necessity for the construction of a railroad, because a year had not elapsed after the dismissal of a prior application, the Court said:

"We are of the opinion that the respondent, the clerk of the Board, was not properly joined . . . His position in reference to his duties is similar to that of the clerk of the County Commissioners or of the clerk of a court of common law. These statutes are to correct alleged errors of law in judicial proceedings . . . we see no reason for making the clerk a party to a suit of this kind."⁸⁰

"In acting upon an application, the Board is engaged in the performance of a quasi-judicial function, and should be moved only by considerations logical to the issue, and not inconsistent with the rights of the parties."⁸¹

"There is no delegation of legislative power to the Public Service Commission in Sections 2 or 6. These sections confer only administrative powers upon that Commission and certain quasi-judicial functions . . . That these sections violated no provisions of the constitution is within the principle of many decisions." (References are to Special Statutes 1915, Chapter 380, as extended by Special Statute, 1917, Chapter 323.)⁸²

"The question before the Department under this statute (authorizing the Department to review action of the City Council in revoking the location of a street railway—the Department decided whether such revocation was consistent with public convenience) is legislative and not judicial in character."⁸³

To the question whether the Court's rulings have materially affected the scope and quality of the Commission's rulings, the answer may be given as a qualified "no." In only 11 of the 41 cases did the Court reverse an order of the Commission. In two of these, the issue was settled by decisions of the

⁷⁸ *Cambridge v. Board of Railroad Commissioners*, 153 Mass. 161 (1891).

⁷⁹ *Bulkeley v. New York, New Haven & Hartford Railroad Company*, 216 Mass. 432 (1914).

⁸⁰ *Weston v. Board of Railroad Commissioners*, 205 Mass. 91 (1914).

⁸¹ *Fall River Gas Works Company v. Board of Gas & Electric Light Commissioners*, 214 Mass. 529 (1913).

⁸² *Brown v. Boston & Maine Railroad Company*, 233 Mass. 502 (1919).

⁸³ *Salem v. Eastern Massachusetts Street Railway*, 254 Mass. 42 (1925).

United States Supreme Court.⁸⁴ Four others involved details of statutory construction which are of no general importance. That leaves six reversals on open questions that have, or may possibly have, some general significance. One required proof that the Board had given notice and hearing to a railroad before an order involving penalties could be entered against it.⁸⁵ Surely there can be no quarrel with that. Another denied the power of the Commission to approve an issue of convertible debentures;⁸⁶ another reversed the Commission in denying approval of an issue of securities to reimburse the company for improvements because such improvements might have been paid for out of income,⁸⁷ (the effect of this decision was thereafter obviated by statute⁸⁸); a fourth reversed the Commission's interpretations of its power in requiring the removal of discriminatory charges; the last held a Commission order requiring a telephone company to furnish service over wires installed by an applicant for service, to be an unwarranted invasion of the company's rights of management.⁸⁹

While obviously these decisions did somewhat restrain Commission activity (the very purpose of judicial review is to restrain administrative commissions when they exceed their lawful powers), it cannot be said that the Court has arbitrarily interfered with Commission work without some show of reason. In each case reversed, the legality of the

order was debatable, and the Court had a plausible basis for its conclusion.

The test of harmonious relations between the Court and the Commissions is to be found, not so much in the preponderance of Commission orders affirmed, but rather in the infrequency with which such orders have been appealed at all. In the 62 years since the first Board was established in 1869 there have been only 41 cases involving orders or powers of these bodies (not all of these were direct appeals from orders)—an average of less than one a year. Such a record may be explained by one of three hypotheses: (1) the Court may have discouraged litigation by its support of the Boards and Commissions, especially by its refusal to review orders involving reasonable discretion in matters of fact; or (2) these Boards may have made litigation infrequently necessary by the intelligent exercise of their powers; or (3) it has been suggested that the utilities may have been given such favorable treatment as to have no motive to appeal.⁹⁰ Other phases of this study will throw light on the last two hypotheses, but our study justifies us in accepting the first as at least a partial explanation.

It is also significant that since the establishment of the present Department of Public Utilities in 1921, only seven appeals have been taken, and only one order reversed. This may indicate an increasing understanding by the Court and the Department of their respective functions.

⁸⁴ *Commonwealth v. Housatonic Railroad Company*, *supra*, n. 32. *Public Service Commission v. New England Telephone and Telegraph Company*, *supra*.

⁸⁵ *Littlefield v. Fitchburg Railroad Company*, *supra*, n. 20.

⁸⁶ *Bulkeley v. New York, New Haven & Hartford Railroad Company*, *supra* n. 65.

⁸⁷ *Fall River Gas Works v. Board of Gas and Electric Light Commissioners*, *supra*, n. 59.

⁸⁸ Acts of 1914, c. 743, §39.

⁸⁹ *New England Telephone and Telegraph Company v. Department of Public Utilities*, *supra*, n. 48.

⁹⁰ Barnes, Irston R., *Public Utility Regulation in Massachusetts*. (New Haven: Yale University Press, 1930), p. 206.

An Analysis of Mississippi River Traffic: 1918-1930

By JOHN D. SUMNER

SINCE the World War a renewed interest in the development of inland waterways has given rise to widespread discussion of various phases of the subject. The Mississippi River especially has been a storm center of controversy. There the Federal Government not only has expended large sums in improving navigation conditions but conducts a growing common carrier service, and through that agency has brought about joint rates and through routes with railroads, built terminals, and lent money to municipalities for terminal construction. The Mississippi Valley on its part has looked to these attempts as a possible means of affording an economical outlet for its manufactured and agricultural products or, failing that, of bringing about favorable adjustments in the railroad rate-structure.

The government carrier service, the Inland Waterways Corporation, was established in 1924 to succeed the Inland and Coastwise Waterways Service, which, in turn, was established in the War Department in 1920 to take over the service begun in 1918 and operated under the United States Railroad Administration.¹ Today it operates on the Warrior River system in Alabama, from Birmingham (the port of Birmingham)

to Mobile and New Orleans; on the Mississippi from New Orleans to Minneapolis; and from St. Louis to Peoria on the Illinois River. Service will be extended to Chicago with the completion of the Illinois waterway project, now planned for 1933. The plan also includes initiation of service to Kansas City on the Missouri River about 1932.² The Illinois River service is new, having started in 1931; service on the Mississippi above St. Louis originated in 1926.

In addition to the activities of the government, privately owned carriers, many attached to large steel, coal, and petroleum companies, and more recently, several important common carriers have made increased use of the Ohio and Mississippi Rivers.³ The federal barge service does not operate on the Ohio.

Most discussions of these developments, particularly those relating to phases of federal activities, have been concerned with their relation to such topics as railroads and railroad rates, farm relief, and costs of waterway development and operation. Questions of how much freight has been moved, and where, and what sort of freight, have been largely neglected. Yet freight is at once a primary purpose and result of inland waterway development.

The present article will analyze Mississippi River traffic, organizing the

¹ For summaries of federal inland waterway activities during and following the World War, see W. D. Hines, *War History of American Railroads*, (New Haven: Yale University Press, 1928); H. A. Van Dorn, *Government Owned Corporations* (New York: Knopf & Co., 1926).

A more detailed survey is presented in *Development of Transportation Facilities in Inland Waterways*, under the terms of the Transportation Act of 1920, up to and

including June 30, 1921 (Washington: Government Printing Office, 1922).

² Annual Report, Inland Waterways Corporation, 1930, p. 2.

³ See *Inland Waterway Freight Transportation Lines in the United States*, U. S. Department of Commerce, Domestic Commerce Series No. 32, Washington, 1930.

discussion around three tropics: (1) the general development of Mississippi River traffic; (2) the growth of the traffic of the federal barge line; and (3) the geography of that traffic. A subsequent article will discuss the commodity characteristics of barge line traffic, including a comparison of the commodity characteristics of railroad traffic.

I. General Mississippi River Traffic

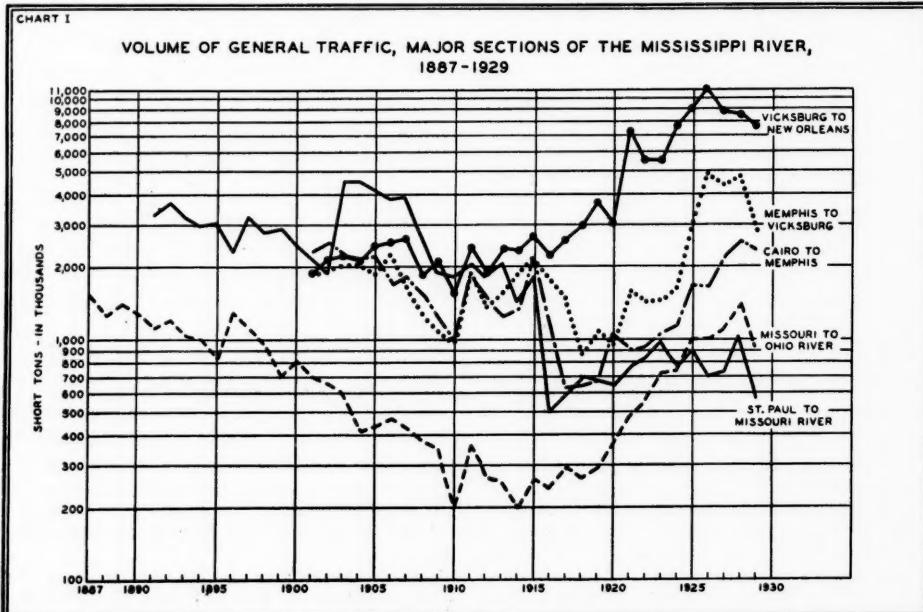
Volume of Traffic. The traffic record of each section⁴ of the Mississippi River is reported annually by the Chief of Army Engineers. For all sections substantially comparable data are available

⁴ The sections used by the Army Engineers for statistical reports have been: St. Paul (more recently Minneapolis) to the mouth of the Missouri; the mouth of the Missouri to that of the Ohio (Cairo); Cairo to Memphis; Memphis to Vicksburg; Vicksburg to New Orleans. In 1928 and 1929 certain changes have been made by the Army Engineers in the upper Mississippi sectors reported separately. These changes do not appear to have affected the comparability of data; hence the names of the former sectors have been used throughout in order to secure continuity.

from 1901 to the present; for the river sector between New Orleans and Vicksburg the record extends to 1891, and for that between the Ohio and Missouri rivers to 1887.⁵

The most outstanding feature of Chart I and Table I, which present this record, is the comparatively marked and rapid increase of traffic since about 1918, with only slight breaks in 1922 and 1923 to a high point, which for most sections, occurred in 1928. A substantial reduction took place in 1929, which doubtless continued in 1930 because of exceptional drought and business conditions. It is significant that, in 1928, traffic between the Ohio and

⁵ These data are assembled in *Transportation in the Mississippi and Ohio Valleys*, No. 2 of the Transportation Series issued by the War Department and the United States Shipping Board (Washington: Government Printing Office, 1929). Data apparently are drawn from the annual reports and records of the United States Army Engineers. Data for the years 1928 and 1929 have been taken from Part II of the reports of the Chief of Engineers, United States Army, 1929 and 1930.



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Missouri Rivers reached an amount higher than that of any year subsequent to 1887. Between Cairo and Memphis the 1928 volume was larger than that of any year since 1902. From Memphis to Vicksburg, the tonnage for each year from 1925 to 1929 inclusive was substantially greater than for any year

TABLE I. VOLUME OF GENERAL TRAFFIC, MAJOR SECTIONS OF THE MISSISSIPPI RIVER,
1887-1929*
(SHORT TONS)†

Year	St. Paul to Mouth of Missouri River‡	Mouth of Missouri to Mouth of Ohio River§	Cairo to Memphis	Memphis to Vicksburg	Vicksburg to New Orleans
1887.		1,537,562			
1888.		1,276,182			
1889.		1,413,594			
1890.		1,299,679			
1891.	3,300,000	1,125,423			
1892.	3,750,000	1,208,205			
1893.	3,200,000	1,057,599			
1894.	2,975,000	1,003,710			
1895.	3,000,000	838,900			
1896.	2,250,000	1,319,688			
1897.	3,200,000	1,115,850			
1898.	2,800,000	959,953			
1899.	2,900,000	700,531			
1900.	2,400,000	810,230			
1901.	2,125,000	703,054	2,306,302	1,856,339	1,835,174
1902.	1,900,000	658,361	2,548,331	1,940,026	2,159,258
1903.	4,545,129	596,484	2,250,260	2,018,222	2,207,692
1904.	4,534,539	421,607	2,153,254	2,040,598	2,117,840
1905.	4,089,318	440,154	2,238,363	1,855,830	2,462,974
1906.	3,847,319	470,093	1,719,893	2,355,901	2,554,336
1907.	3,919,440	435,542	1,835,746	1,661,406	2,585,277
1908.	2,581,857	374,093	1,550,659	1,252,222	1,867,912
1909.	1,916,114	352,055	1,232,093	1,071,037	2,104,720
1910.	1,836,035	191,965	1,039,195	980,386	1,530,230
1911.	2,081,566	369,295	1,857,616	1,910,854	2,426,376
1912.	1,830,294	265,720	1,425,922	1,394,789	1,807,740
1913.	2,145,315	258,709	1,261,662	1,542,456	2,417,859
1914.	1,426,970	204,118	1,321,081	1,888,394	2,343,623
1915.	1,883,668	258,501	2,193,026	2,198,814	2,712,022
1916.	499,531	240,653	1,205,667	1,809,977	2,234,238
1917.	586,420	293,248	635,444	1,493,500	2,549,654
1918.	696,503	264,149	638,684	872,180	2,894,255
1919.	674,192	288,286	660,953	1,071,426	3,681,715
1920.	630,951	363,082	1,048,432	937,763	3,014,744
1921.	761,522	481,151	902,823	1,629,747	7,323,335
1922.	818,059	548,114	923,386	1,441,048	5,544,506
1923.	973,567	723,068	1,048,322	1,452,837	5,493,297
1924.	769,139	738,728	1,153,021	1,666,440	7,633,277
1925.	908,005	1,003,569	1,688,654	3,212,259	9,101,650
1926.	691,637	1,005,979	1,660,188	4,792,780	11,074,488
1927.	715,110	1,110,402	2,144,317	4,358,097	8,816,745
1928.	1,034,972	1,430,183	2,531,256	4,803,840	8,654,626
1929.	558,852	891,756	2,328,334	2,835,060	7,727,383

*Figures for the section of the river "mouth of the Missouri to mouth of Ohio river" for the years 1887-1929 have been compiled from *Annual Reports of the Chief of Engineers, United States Army, Part II*. Sources for the other sections of the river are: years 1890 or 1901 to 1927, *Transportation in the Mississippi and Ohio Valleys, Transportation Series No. 2, Corps of Engineers, United States Army, Government Printing Office, 1929, pp. 184-185*; years, 1916-1929, *Annual Reports of the Chief of Engineers, United States Army, Part II*. These two sources agree in all overlapping years.

†Quantity includes rafted lumber and logs.

‡In 1928 and 1929, the section "St. Paul (or Minneapolis) to mouth of Missouri" is not reported but a new division "mouth of Wisconsin to mouth of Illinois" reports traffic, the volume of which in the years 1923-1927 agrees with that reported formerly for this section. Therefore, data for the new section have been substituted in these two years.

§In 1928 and 1929, the section "mouth of Missouri to mouth of Ohio River" becomes "mouth of Illinois to mouth of Ohio." This change involves no inconsistencies since there is little if any traffic interchange with the Missouri river, located only a few miles south of the Illinois river. Data for the two sections for the years 1920-1927 agree.

recorded. Between Vicksburg and New Orleans the record is still more favorable to the river. All years since 1917 have shown a larger tonnage than that reported for any previous year, while the freight reported in 1926 amounted to roughly four times that reported for any year prior to 1918. The northern section of the river, between St. Paul and the Missouri River, did not participate in this growth to the same extent; however, the volume of freight carried in 1928 was the largest since 1915.

The rate of growth from 1918 to 1928 is impressive. Traffic on the various sections of the river in 1928 and in 1929, expressed as a percentage of that of 1918, was as follows:

	1928	1929
St. Paul to the Missouri River	148.6%	80.2%
Between Missouri and Ohio Rivers	541.4	337.6
Cairo to Memphis	396.3	364.6
Memphis to Vicksburg	550.8	325.1
Vicksburg to New Orleans	299.0	267.0

Unfortunately a figure cannot be obtained for any of these years which eliminates duplications between sections of the river.⁶

Character of General River Traffic. While a more detailed analysis of the characteristics of federal barge line traffic will be presented subsequently, certain characteristics of general river traffic may be pointed out.

An examination of the commodities entering into general river traffic discloses that certain items, varying somewhat with sectors of the river,

are of particular importance from the point of view of tonnage. On the upper river, between the Missouri River and Minneapolis, sand, gravel, rock, and crushed stone accounted for 76.7% of all traffic in 1929. Grain was also an important item. Between the Ohio and Missouri Rivers stone, sand, and gravel were of less relative significance, but accounted for 23.7% of the freight transported. Grain, lumber and logs, coal, and sugar were also important commodities in point of tonnage. Between Cairo and Memphis, barged and rafted logs; sand, gravel, and stone; coal; concrete and cement; sugar; bauxite ore; and iron and steel products accounted for 76.4% of freight transported. Grain was also an important commodity. From Memphis to Vicksburg, logs and sugar were the most important commodities, while stone, sand, and gravel; iron and steel; grain; cotton; bauxite ore; gasoline; and coal and coke were also important. Together these articles amounted to 54.1% of all traffic. From Vicksburg to New Orleans, petroleum and its products, destined for the coastwise and foreign trade, accounted for 5,296,328 tons, or 60.7% of the total tonnage of this sector. Other large items included grain, sugar, bauxite ore, crude oil, fuel and gas oil, gasoline, cotton and linters, logs, and iron and steel.

Value of River Traffic. While a comparatively few commodities moving in large volume, and often of a low-grade, bulky character, account for a substantial proportion of river traffic, it is

⁶ An estimate contained in *Transportation in the Ohio and Mississippi Valleys*, prepared by the Corps of Engineers of the United States Army, and by the Shipping Board, is that "eliminating all known duplications, the net traffic on the Mississippi proper between St. Paul and New Orleans was 15,154,072 tons in 1926 and 12,176,340 tons in 1927. In 1925 the net traffic of the river between St. Louis and New Orleans was 13,141,000 tons." (p. 189.) The average of the percentage of

these figures to the summation of traffic for those years is 77.5%. Applying that percentage to the sum total of traffic in 1928 and 1929 would give 14,302,530 and 11,114,573 tons, respectively, as the net amount for those years. Allowing for inaccuracies in data, it is apparent, nevertheless, that river traffic during the decade following 1917 has experienced a spectacular growth which has carried the volume of traffic to an amount substantially larger than that of any period within reasonably comparable record.

incorrect to reason solely from this circumstance to the conclusion that river freight is of much lower grade than railroad freight. While a precise comparison is impossible, two facts should be noted: (1) a large proportion of railroad freight is also of bulky, low-grade character, a point more fully developed in the subsequent analysis of federal barge line traffic; and (2), Mississippi River traffic is of much higher average value per ton, relative to railroad freight, than is commonly supposed. Particularly is this true of those sectors of the river below St. Louis.

According to a statement in a recent (1930) study of the Bureau of Railway Economics:

"Low-grade freight is also the rule on the Mississippi-Ohio System, as indicated by . . . the . . . report of the Chief of Engineers, covering the year 1928, as follows: 'The gross total traffic on the Mississippi River and its tributaries, including the Ohio River system, amounted to 79,794,356 tons, valued at \$1,187,770,304.'

The gross total traffic on the Ohio River and its tributaries amounted to 58,573,535 tons, valued at \$417,759,706.⁷

"This makes the average value of freight on the Mississippi-Ohio System \$14.89 per ton, and on the Ohio Section \$7.13 per ton. According to the Interstate Commerce Commission, the average value of freight moved by the Class I steam railways in the United States during 1928 was \$53.08 per ton at destination, carload traffic averaged \$48.74 per ton, and less than carload freight \$200

per ton. Railway freight traffic is clearly of higher grade than that moving generally by river."⁸

However, the average value per ton of freight moving on the various sections of the Mississippi proper, excluding Ohio River traffic, shows very different results than those of the Bureau of Railway Economics study. Table II presents the traffic volume on each section of the Mississippi River for 1928 and 1929, together with the average value per ton, computed from the *Annual Reports* of the Chief of Army Engineers, Part II.⁹

The data disclose a surprising similarity between the reported values for river and railroad traffic. While the 1928 reported values for river freight are in all cases but one below the average value of railroad freight, the difference in the case of lower river sectors is not marked. In 1929 the average value reported for river freight is in most cases substantially higher than that of the railroads. It is unfortunate that 1929 railroad values are not obtainable, although the result would probably be little changed. The character of river traffic is much more fluctuating than is that moving by railroad; hence an average of 1928 and 1929 river data is shown in addition to the annual figures. Furthermore, the wholesale price index of the Bureau of Labor Statistics shows a slight decline from 97.7 in 1928 to 96.5 in 1929 (1926 = base year), thus making

⁷ *Annual Report, Chief of Army Engineers, 1929, Part II, Commercial Statistics for 1928*, p. 2.

⁸ *An Economic Survey of Inland Waterway Transportation in the United States*, Bureau of Railway Economics, Washington, 1930, pp. 24-25.

⁹ According to a statement by the Chief of Army Engineers to the writer, by correspondence dated May 6, 1931, value of freight traffic "is computed from wholesale market values at destination based on commodity value furnished by Chamber of Commerce and in local market quotation." While precise accuracy should not be expected in such data, they provide a sufficient approximation for purposes of a general comparison with railroad commodity values. The Interstate Commerce

Commission study, in explaining how "values" were arrived at, states on page 1: "The value of the commodities is based on wholesale prices obtained from various sources and relating as nearly as practicable to the close of the year 1928. Where a commodity class contains two or more articles, an unweighted average or estimate had to be used. Where the price used referred to point of production the average freight revenue per ton for the class was added so that values at destination might be uniformly obtained. . . ." (*Freight Revenue and Value of Commodities Transported on Class I Steam Railways in the United States, 1928*.)

it probable that the higher river values in 1929 were not caused by a rise in the price level. Only one major commodity group in the Bureau of Labor Statistics reports—namely, metals and metal products—showed an increase (from 99.8 to 104.4).

The accuracy of river statistics is impaired by the failure to eliminate duplications in traffic between sectors. Possibly also the price data of the Army Engineers originate from less accurate sources than those of the Interstate Commerce Commission. However, these statistics are not urged as conclusive proof that Mississippi traffic is identical in value with that carried by railroads. They are sufficient, however, to place a decided burden of proof upon those who would apply to present Mississippi traffic the usual generalizations concerning the low-grade character of inland water traffic relative to that carried by

railroads. A more detailed comparison between federal barge line freight and that of selected railroads is presented subsequently.

Length of Haul. In addition to the commodity and value character of river freight commented on above, it is apparent that on the lower division of the river shipments are not restricted to local hauls. Petroleum and petroleum products enter heavily into coastwise and foreign commerce, and also are important north bound shipments to distribution and refining points; grain is destined chiefly for export; bauxite ore is imported from South America and is transshipped by barge to St. Louis.¹⁰ Iron and steel products come largely from the Pittsburgh district whence they are sent to distributing points as far

¹⁰ Bauxite ore carriage was entirely lost to the barge line in 1930 by rail competition.

TABLE II. TONNAGE AND AVERAGE VALUE PER TON AT DESTINATION OF ALL COMMODITIES CARRIED BY CLASS I RAILWAYS, 1928, AND BY SECTIONS OF THE MISSISSIPPI RIVER, 1928, 1929, AND AVERAGE OF 1928-1929.*

Railroads and Sections of River	Volume (Short Tons)			Value Per Ton at Destination (Dollars)		
	1928	1929	Average	1928	1929	Average
Class I Railroads.....	1,285,942,976†	.....	1,285,942,976	\$53.08	\$	\$53.08
All River Sections						
Including Foreign and Coastwise.....	18,476,509	14,431,779	16,454,144	42.10	\$48.56	44.94
Excluding Foreign and Coastwise.....	14,269,675	10,135,450	12,202,563	49.66	62.44	54.97
River Sections‡						
Minneapolis to Mouth of Wisconsin.....	21,632	90,393	56,013	12.99	125.62	103.88
Wisconsin River to Illinois River.....	1,034,972	558,852	796,912	15.94	29.33	20.63
Illinois River to Ohio River.....	1,430,183	891,756	1,160,970	48.01	75.53	58.58
Cairo to Memphis.....	2,531,256	2,328,334	2,429,795	59.65	64.45	61.95
Memphis to Vicksburg.....	4,803,840	2,835,060	3,819,450	52.81	81.42	63.43
Vicksburg to New Orleans Including Foreign and Coastwise.....	8,654,626	7,727,383	8,191,005	33.26	29.10	31.30
Excluding Foreign and Coastwise.....	4,447,792	3,431,055	3,939,424	49.15	45.73	47.66

*Railroad data from Interstate Commerce Commission study, *op. cit.* River data computed from *Annual Report*, Chief of Engineers, United States Army, Part II, 1930.

†Revenue freight originated.

‡Includes floated logs.

§Railroad value data for 1929 not obtainable.

south as New Orleans.¹¹ Coal, likewise, comes from Ohio River points of origin. Sugar is a north bound commodity, being sent as far as the Twin Cities and its ultimate destination is by no means restricted to river points.

II. Growth of Federal Barge Line Traffic

Common carrier service on the Mississippi River is performed chiefly by the Inland Waterways Corporation, which in 1929 owned 99.4% of all barge capacity of common carriers operating on the Mississippi only, and 25.7% of that owned by common carriers operating either on the Mississippi or the Mississippi and its tributaries, including the Ohio.¹² A considerable proportion of the remaining common carrier tonnage is owned by two rather recently organized companies most of whose operations are on the Ohio, while those of the government line under consideration are confined to the Mississippi River.

The traffic of the government common carrier service reflects more completely than does general river freight the results of recent developments in important factors affecting river transport. The government working chiefly through the Inland and Coastwise Waterways Service and its successor, the Inland Waterways Corporation, has directly sponsored and partially financed the building of improved terminals. Likewise, it has experimented with equipment, and adequate financing has resulted in a modern fleet. Finally, the government has forced a considerable degree of railroad cooperation through interchange and joint rates, and has succeeded in establishing an administra-

tive organization far better equipped than most common carrier services to carry on river transport successfully.

The volume of traffic carried by the federal barge line during the years 1918 to 1930 has grown rapidly (Table III).¹³

TABLE III. VOLUME OF TRAFFIC OF FEDERAL BARGE LINE, UPPER AND LOWER DIVISIONS AND TOTAL, MISSISSIPPI RIVER, 1918-1930*

Years	Volume (Short tons)		
	Total River	Lower Division	Upper Division
1918.....	23,378	23,378	.....
1919.....	104,769	104,769	.....
1920.....	160,702	160,702	.....
1921.....	443,267	443,267	.....
1922.....	599,669	599,669	.....
1923.....	710,431	710,431	.....
1924.....	849,503	849,503	.....
1925.....	910,755	910,755	.....
1926.....	1,045,644	1,044,649	995
1927.....	1,251,513	1,237,452	14,061
1928.....	1,555,208	1,435,560	119,648
1929.....	1,398,826	1,292,876	105,950
1930.....	1,255,358	1,149,864	105,494

*Volume for 1918-1921 from *Transportation in the Mississippi and Ohio Valleys*, Transportation Series No. 2, Corps of Engineers, United States Army, Government Printing Office, 1929, p. 108. Volume for 1922-1930 compiled from *Annual Reports of the Inland Waterways Corporation, 1923-1930*.

Outstanding is the continuity of the increase, for the year 1929 marks the first break in the trend. The increases in lower Mississippi tonnage of each year over that preceding were as follows:

	Tons	Tons	
1919.....	81,391	1925.....	61,252
1920.....	55,933	1926.....	133,894
1921.....	282,565	1927.....	192,803
1922.....	150,402	1928.....	198,108
1923.....	110,762	1929.....	142,684 (decrease)
1924.....	139,072	1930.....	143,012 (decrease)

The declines in 1929 and 1930, which were to a considerable extent induced by the low water of those years, were less than the increases of the two prior years.

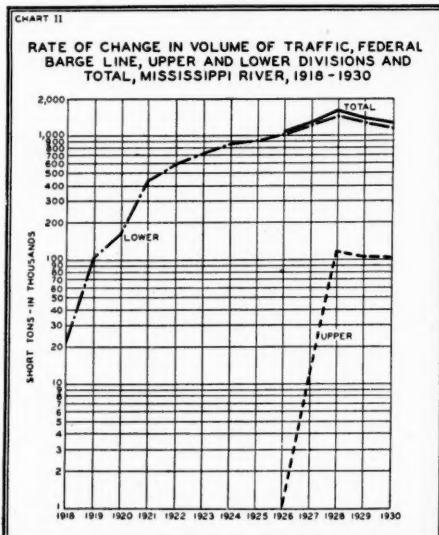
The rate of traffic increase, however,

¹¹ Data compiled from *Inland Waterway Freight Transportation Lines in the United States, op. cit.*

¹² The amount of interchange between the two divisions is too small to affect appreciably the accuracy of the representation of total traffic as the summation of that of the two divisions.

¹³ Illustrating the importance of the Mississippi to the iron and steel trade, see "River Steel Shipments Effect Large Savings," 122 *Iron Age* 932 (October 11, 1928); "Water Shipments of Pig Iron and Steel Greatly Increased," 123 *Ibid.* 64-6 (January 3, 1929); and editorial, 77 *Iron Trade Review* 1599 (December 24, 1925).

is less spectacular. It is more clearly shown by Chart II, which presents the subject matter of Table III reduced to logarithmic scale. A flattening of the traffic curve is noticeable between 1921 and 1925, with a slight increase in the



rate of growth from 1926 to 1928 inclusive. The continuity of the growth of federal barge line traffic is in contrast to the irregularity of the development of general river traffic disclosed on Chart I.

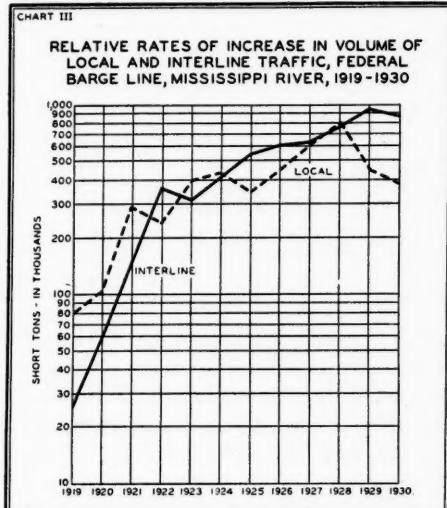
III. Geography of Barge Line Traffic

Four characteristics are outstanding in the geography of federal barge traffic: (1) the increasing preponderance of freight interchanged with railroads; (2) the concentration of traffic at a comparatively few large centers; (3) the relatively long distance and through character of most shipments; and (4) the development of a substantial north bound tonnage resulting in a greater degree of traffic balance.

¹⁴ Interline traffic is chiefly that interchanged with railroad, although "the term 'local' includes all traffic originating at or having final destination on points served by us, including traffic imported and exported

Interchange with Railroads. The increasing proportion of freight interchanged with railroads is illustrated by Table IV and Chart III. The former shows the volume of the interline and local freight of the barge line by years since 1919.¹⁴ While the relative importance of each group is irregular, there is a marked tendency for interline traffic, which represents freight interchanged chiefly with railroads, to occupy a relatively more significant position than local traffic.

This tendency is likewise evident from Chart III, showing the relative rate of



increase of both local and interline freight. It is important to note that the increase in interline traffic has been substantially more rapid than that of local traffic. This is particularly noticeable in 1928 and 1929, for interline traffic increased in the latter year even more rapidly than in 1928 or in any

through the Port of New Orleans. The term 'interline' covers all other traffic, whether interchanged with railroads, steamships or steamboat lines. We have no figures segregating the amount of interchange as between rail and water carriers." (From letter from Inland Waterways Corporation to writer, April 11, 1931.)

TABLE IV. AMOUNT AND PERCENTAGE DISTRIBUTION OF VOLUME OF LOCAL AND INTERLINE TRAFFIC, FEDERAL BARGE LINE, MISSISSIPPI RIVER, 1919-1930.*

Year	Volume (short tons)			Percentage Distribution		
	Total	Interline	Local	Total	Interline	Local
1919.....	104,769	25,056	79,713	100.0	23.9	76.1
1920.....	160,702	57,868	102,834	100.0	36.0	64.0
1921.....	443,267	155,757	287,510	100.0	35.1	64.9
1922.....	599,669	361,710	237,959	100.0	60.3	39.7
1923.....	710,431	317,496	392,935	100.0	44.7	55.3
1924.....	649,503	411,806	437,697	100.0	48.5	51.5
1925.....	910,755	550,572	360,183	100.0	60.5	39.5
1926.....	1,045,644	600,926	444,738	100.0	57.5	42.5
1927.....	1,251,513	634,573	616,940	100.0	50.7	49.3
1928.....	1,555,208	764,842	790,366	100.0	49.2	50.8
1929.....	1,399,826	942,831	455,996	100.0	67.4	32.6
1930.....	1,255,358	867,248	388,110	100.0	69.1	30.9

*Volume for years 1918-1921 from *Transportation in the Mississippi and Ohio Valleys*, Transportation Series No. 2, p. 108, Corps of Engineers, United States Army, Government Printing Office, 1929. Volume for 1922 to 1930 from *Annual Reports of the Inland Waterways Corporation*, 1925-1930.

year subsequent to 1925, despite conditions which reduced the total 1929 traffic. Furthermore, the greater regularity which is characteristic of interline traffic is a circumstance of major transport significance. This is especially true since higher-revenue, manufactured, and miscellaneous products are drawn largely from interline traffic, while grain and bauxite ore, lower-revenue items, are chiefly "local" in character.¹⁵ Railroad interchange has also resulted in a greater diversity and regularity of barge traffic, as well as in increased participation in the carriage of higher-revenue freight.

The development of interline traffic is likewise an index of the increasing geographic significance of barge line operations. Without rail-water interchange, traffic necessarily is confined to freight local to the banks of the river, or to certain commodities, such as grain, which may be sent to river points by railroad and there stored before being reshipped. Without railroad interchange, whatever "benefits" accrue from water

transport are much more localized than if there is greater integration of water and rail transport agencies.

Evidence of the geographic effect of railroad interchange is demonstrated by the fact that fewer than $\frac{1}{2}$ of the states receiving sugar transported by the Mississippi and Warrior divisions of the barge line border on either the Mississippi or Warrior Rivers.¹⁶ Furthermore, in 1929, 74.8% of the sugar carried by the lower Mississippi division was interchanged with railroads.¹⁷

Further evidence of the wide geographic significance of barge line operations is shown by the distribution of coffee handled by this carrier in 1926. A total of 16,755 tons of coffee moved northward from New Orleans in that year, of which the following points of destination received the amounts noted:

City	Tons Received
Chicago.....	6,787
Omaha.....	2,239
St. Louis.....	1,658
Denver.....	958
Peoria.....	903
Memphis.....	768

¹⁵ See data in *Weekly Statistical Sugar Trade Journal*, March 8, 1928 and March 7, 1929.

¹⁶ Compiled from *Annual Report* of the Chief of Army Engineers, 1930, Part II.

¹⁵ See distribution of individual commodity tonnage between local and interline, in Part II of *Annual Reports of Chief of Army Engineers*.

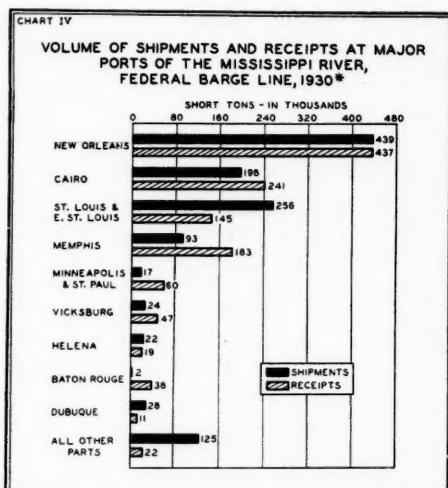
A significant point is that only two of the cities named are located on the waterways.¹⁸

The area affected by barge line operations may be expected to increase as shippers become accustomed to and acquainted with barge service and as through routes and joint rates become more extensively applied. The extension of routes and rates is dependent largely upon Interstate Commerce Commission policy. It seems probable that whatever growth takes place in barge line traffic may be expected to occur primarily in "interline" rather than in "local" freight.

Concentration of Traffic. The concentration of barge operations at a relatively few points—New Orleans, Cairo, St. Louis and East St. Louis, and Memphis—with smaller amounts at Minneapolis and St. Paul, Vicksburg, Baton Rouge, and Dubuque, is shown by Chart IV. "All other" river ports account for but a negligible portion of barge traffic. This concentration is in part a reflection of the long distance and through character of much barge line traffic. In part it is a result of the existence of better terminals at these points, including facilities for rail-water interchange. Interline traffic is an especially important factor in explaining the concentration of traffic at certain river cities. While statistics showing the amount of traffic interchange at the various ports are not available, Cairo, Memphis, St. Louis, East St. Louis, New Orleans, Vicksburg, Baton Rouge and Helena, on the lower river, are important interchange points, ranking approximately in the order named. On the upper river, Dubuque, St. Paul, and Burlington are the most important points of interchange.¹⁹

Long Distance Shipments. An examin-

¹⁸ Data from *Transportation in the Mississippi and Ohio Valleys, op. cit.*, p. 226.



*From Inland Waterways Corporation, *Annual Report*, 1930, Exhibit 17.

ation of the traffic statistics in the 1929 and 1930 annual reports of the Inland Waterways Corporation discloses the generally long-distance character of barge line operations.²⁰ The traffic relations of New Orleans, for example, are chiefly with Cairo, St. Louis, East St. Louis, and Memphis, to which points it ships a somewhat larger volume of freight than is received. The traffic of Cairo and of St. Louis and East St. Louis is chiefly long-distance, being for the most part with New Orleans, although in each case a certain amount of shorter-distance traffic takes place with Memphis and intermediate points. Minneapolis-St. Paul freight, while not large in volume, is interesting in that it is so concentrated at New Orleans and Dubuque. Most of the Twin Cities' shipments by river are grain, of which the largest portion goes to New Orleans for export. Their receipts are chiefly from Dubuque, as already noted.

North Bound Tonnage and Traffic Bal-

¹⁹ Information from letter of Inland Waterways Corporation to writer, April 11, 1931.

²⁰ See *Annual Reports*: 1929, pp. 48-9; 1930, pp. 40-1.

TABLE V. AMOUNT AND PERCENTAGE DISTRIBUTION OF NORTH BOUND AND SOUTH BOUND TRAFFIC, FEDERAL BARGE LINE, MISSISSIPPI RIVER, 1918-1930.*

Year	Volume (in tons)			Percentage Distribution		
	Total	North Bound	South Bound	Total	North Bound	South Bound
1918.....	23,378	2,281	21,097	100.0	9.8	90.2
1919.....	104,769	35,428	69,341	100.0	33.8	66.2
1920.....	160,702	56,889	103,813	100.0	35.4	64.6
1921.....	443,267	130,425	312,842	100.0	29.4	70.6
1922.....	599,669	267,853	331,816	100.0	44.7	55.3
1923.....	710,431	319,561	390,870	100.0	45.0	55.0
1924.....	849,503	440,901	408,602	100.0	51.9	48.1
1925.....	910,755	480,644	430,111	100.0	52.8	47.2
1926.....	1,045,644	568,634	477,010	100.0	54.4	45.6
1927.....	1,251,513	728,238	523,275	100.0	58.2	41.8
1928.....	1,555,208	842,335	712,873	100.0	54.2	45.8
1929.....	1,308,826	790,352	688,474	100.0	56.5	43.5
1930.....	1,255,358	655,794	599,564	100.0	52.2	47.8

*Volume for 1918-1921 from *Transportation in the Mississippi and Ohio Valleys*, Transportation Series No. 2, Corps of Engineers, United States Army, Government Printing Office, 1929, p. 198. Volume for 1922-1930 from *Annual Reports of the Inland Waterways Corporation*, 1925-1930.

ance. The balance between north and south bound traffic is a matter of prime importance from the standpoint of economic operation of river transport. Early river traffic was preponderantly south bound in character. Downstream shipments of grain, coal, cotton, and later, of iron and steel, have long required a large volume of boat tonnage, while upstream traffic developed more slowly. Indeed, in the days of cheap lumber, when wooden barges were used for only one trip downstream, lack of back haul freight was economical. That situation no longer exists.

Table V and Chart V show the relative shortage of north bound freight in the early years of operation of the federal barge line, and the gradual development of this traffic. The rate of increase in north as compared with south bound traffic has been more even, as well as more rapid and substantial (Chart V). Economic operation of the line would seem to require further development of

downstream traffic, for its volume has been less than that upstream since 1924.²¹

Table VI, which shows the proportion of railroad interchange in the north and south bound shipping, is of interest as

TABLE VI. PERCENTAGE OF INTERLINE TO TOTAL NORTH BOUND AND TO TOTAL SOUTH BOUND TRAFFIC, FEDERAL BARGE LINE, UPPER AND LOWER DIVISIONS, MISSISSIPPI RIVER, 1927-1929.*

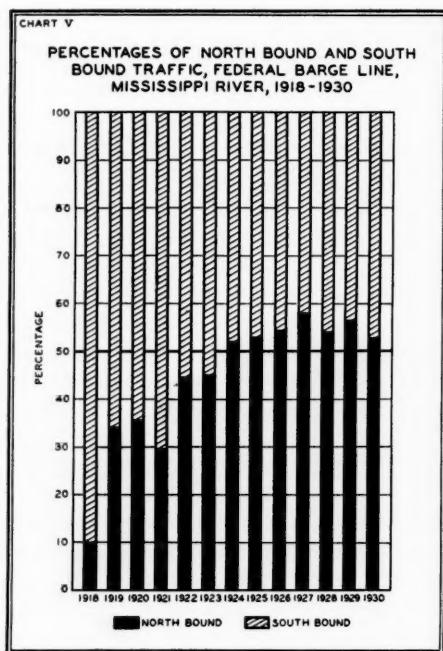
Year	Lower River		Upper River	
	North Bound	South Bound	North Bound	South Bound
1927.....	49.7%	52.9%	33.5%	1.1%
1928.....	41.1	62.2	64.9	52.8
1929.....	60.6	78.4	64.0	16.5

*Compiled from *Annual Reports of the Chief Army Engineers*, Part II. Data for 1930 not available.

an index of the geography of barge line operations. The greater preponderance of interline freight in south bound traffic of the lower division may be explained by the relatively wide area from which freight is drawn; much of the freight is received from north central manufactur-

²¹ Particularly is this true in view of greater costs and power required for upstream navigation. According to the Chairman of the Inland Waterways Corporation, T. Q. Ashburn, it requires twice the fuel to carry half-capacity cargo upstream as for full-cargo downstream

navigation on the lower Mississippi. (T. Q. Ashburn, "Waterway Transportation from the Viewpoint of Operation," 56 *Proceedings of the American Society of Civil Engineers* 546 (March, 1930).)



ing districts which are located away from the river. Cotton and tobacco, among agricultural products, are also largely fed to the barge line by railroads.²² On the upper division, the north bound freight to the Twin Cities comes chiefly from the Chicago and north central districts, and is shipped by rail to Dubuque where it is transferred to barges.

Summary

While traffic is still small relative to that moving by railroads, the Mississippi River nevertheless shows signs of becoming an important factor in the commerce of the Mississippi Valley. Traffic has experienced a phenomenal growth since 1918 which has carried its shipping to a point substantially in excess of any period during the 40 odd years for which comparable statistics are

²² See detailed statistics in *Annual Reports, Chief of Engineers, United States Army, Part II.*

available. However, the rate of growth has diminished during the later years of the period, and 1929 and 1930 witnessed an actual decline in shipments.

Contrary to general supposition, the traffic of the river is not confined to a few low-value, bulky, raw materials. On the contrary, its freight shows an average value per ton substantially comparable to that of the railroads of the country, and is higher than that of the Ohio River. The comparison between the character of rail and river freight, and its significance, will be more thoroughly gone into in the next portion of this article. However, it may be noted at this point that the character of river freight materially affects both the commercial importance of the river, and the competitive relations between river and railroad.

The development of freight interchange with railroads has been carried forward with rapidity, until the major portion of barge line freight is jointly transported. This is in contrast to conditions prevailing prior to the present decade, and is significant in several respects. It demonstrates some success in the attempt to establish a degree of integration in the rates and routes of rail and water transport companies. It indicates that the barge line enters into the transport arrangements of a much wider area than would otherwise be possible. Moreover, railroad interchange permits the barge line to develop greater traffic diversity and tends to stabilize its traffic flow.

North bound traffic now includes slightly more than half the barge line freight. Thus, in contrast to former times, economical operation now requires further development of downstream traffic, especially in view of the greater difficulty of up-stream navigation.

Connecticut's Regulation of Grade Crossing Elimination¹

By CLYDE OLIN FISHER

DURING recent months the State of Connecticut presented an anomalous, if not a peculiar, situation in the elimination of grade crossings for railroads. Action in court was brought against the Public Utilities Commission for failure to enforce the provisions of a law which, subsequent to the starting of the litigation, the last Legislature repealed. Further, the same session of the Legislature repealed the law specifying the procedure and the machinery under which this litigation was begun. In short, had the Court decided the case against the Commissioners and ordered their removal from office for failure to perform their duty, it would have removed them for an act, or failure to act, under the provisions of a law which the last Legislature interpreted as an anachronism, thereby giving legislative sanction for the judgment exercised by the Commissioners. Further, it would have penalized the Commission by a procedure which this General Assembly, in repealing the law, regarded as unnecessary, if not unwise. One of the three members of the Commission against whom action was taken died before the case was adjudicated. Another member whose term of office expired subsequent to inauguration of the legal proceedings was re-appointed by the Governor of the State and confirmed by the General Assembly before the courts decided the issue. For a full understanding of this case and an evaluation of its significance for the future of

grade crossing elimination in Connecticut, a tracing of the legislation on this problem is necessary.

History of Grade Crossing Legislation

Recent developments suggest the study of the various measures taken by Connecticut in the past with a view to greater safety at grade crossings. Experience along this line divides itself into two parts, that during the administration of the Railroad Commission and that since 1911 when the Public Utilities Commission became the administrative agency to which this work was delegated by law.

The Railroad Commission and Grade Crossings

Connecticut in 1853 enacted a law creating a Railroad Commission. It seems that the immediate stimulus leading to legislative enactment was an accident in which a train plunged into an open draw. Consequently, in 1853, the Legislature provided for a commission to control the operation of trains in such manner as to insure the public safety.² The first railroad charter had been granted by the Connecticut Legislature in 1832 and the first train was operated in 1839 on the Stonington Road.³ Almost from the beginning of the railroad industry in Connecticut attention was directed to the menace of grade crossings and legislation was enacted to remedy the situation. A law of 1849 prohibited the construction of a railway

¹This paper is part of a more general study made possible by the award of a grant-in-aid by the Social Science Research Council.

²Public Acts 1853, c. 74; Report Conn. R. R. Com. 1885, p. 38.

³Ibid., 1855, p. 4.

across a highway unless special permission of a commission had been secured.⁴

The Railroad Commission in its early reports to the Legislature emphasized the dangers at grade crossings and recommended legislation. In 1862 the Commission spoke of these crossings as "one great cause for anxiety"⁵ and indicated that there were then approximately 750 such crossings in the State. Acting under authority already conferred upon it by law, the Commission had required the construction of warning boards and the presence of flagmen at crossings in the more thickly populated sections. It had also limited the speed of trains at such places.⁶

A recommendation of the Commission in 1870 was prophetic of the legislation finally enacted in 1889, which has served as the basis for the recent litigation in Connecticut. At that time the Commission recommended the passage of a "law which will tend to abolish all such crossings within a certain number of years upon all railroads."⁷ It is interesting to note that the Commission quoted a superintendent of the Hartford and New Haven Railroad as of the opinion that the State would be constrained to abolish all grade crossings on highways within a period of 10 years.⁸ The passage of more than 50 years leaves that prophecy far from fulfillment in Connecticut and the road that has resisted its completion is the successor to the one the superintendent of which made the prophecy.

As a result of this recommendation, or growing out of the conditions that prompted the recommendation, the Legislature in 1870 enacted a law forbidding the laying out of any new highway

or street crossing a railroad at level, except with written permission of the Railroad Commission after a hearing and the showing of cause.⁹ In case the crossing at grade did not receive the approval of the Commission the latter body should determine whether the highway should go over or underneath the railroad. The railroad in this event had to pay half the cost incurred. But such a law did not remove the dangers at crossings that had already come into existence. Hence, to solve this difficulty the Railroad Commission asked in 1871 "that an act be passed, giving authority to change and abolish grade crossings, and highways parallel to railroads, whenever it is possible to do so, throughout the State, upon or near any and all railroads."¹⁰

Prior to 1876 grade crossing elimination could be effected only in those cases in which it was possible to reach an agreement between those interested. Acting upon the recommendation of the Railroad Commission in 1876, the Legislature authorized it to order a highway taken over or underneath a railroad or to change the location of the railroad or of the highway, the initiative in such cases coming through petition to the Commission.¹¹

This law did not give the Commission power to refuse to permit any crossing at all; it conferred upon it only the right to decide the manner of crossing. In 1878 the Commission asked the Legislature to increase its powers so as to enable it to "disallow a crossing altogether."¹² In 1883 this request was granted in larger measure than asked. The Legislature passed a law¹³ extending

⁴ *Ibid.*, 1886, p. 6.

⁵ *Ibid.*, 1862, p. 8.

⁶ *Ibid.*

⁷ *Ibid.*, 1870, p. 5.

⁸ *Ibid.*

⁹ Public Acts 1870, Title xvi, c. 7; Report Conn. R. R. Com. 1873, p. 323.

¹⁰ Report Conn. R. R. Com. 1871, p. 7.

¹¹ *Ibid.*, 1886, p. 7; *Ibid.*, 1881, p. 40 of Statutes.

¹² *Ibid.*, 1878, p. 13.

¹³ *Ibid.*, 1886, p. xxiv of Statutes.

a blanket prohibition against the construction of any new highways to cross a railroad at grade. The Commission was given power to require the highway to go over or underneath the railroad and to assess one-half the cost against the railroad, the other half against the governmental division constructing the highway. This law has never been repealed in Connecticut to the present day. The following year the Commission was accorded the right to take the initiative in bringing about grade crossing removal.¹⁴

Notwithstanding the progress that had been made, both as to the elimination of existing crossings and as to the prevention of new ones, the Railroad Commission insisted upon more positive and aggressive action. In its report for 1886 is found a suggestion for the law finally enacted in 1889, which was repealed in 1931 as a result of the litigation against the Public Utilities Commission. The Commission asked "that the law should compel the change of a certain number of crossings yearly, that, if you please, it should be made the imperative duty of the Commissioners to require this."¹⁵

The above recommendation was followed by the introduction of a bill requiring that not less than 2% and not more than 5% of the crossings be eliminated on each road annually. The representative of the New Haven Railroad, at the hearing on the proposed bill, insisted that no maximum number be

placed for the road or, at least, that the maximum be made larger.¹⁶ If this position seems strange in view of the recent resistance of the railroads to the removal of crossings, it must be observed that the New Haven road had already formulated plans for eliminating all grade crossings on its main line. Also, the cost of removal at that time was relatively small in contrast with what is now involved. The bill was modified so as to permit the division of cost between the railroad and the State, instead of the towns, and then passed the House. The Senate rejected the measure and left the situation as it was, namely, either the roads or the local governmental units could apply for the removal of any number of crossings and have the Railroad Commission apportion the expense.

In its report for 1887 the Commission notes that it had been called upon in four instances during the year to determine whether a proposed highway should go over or underneath the railroad.¹⁷ Even though the law was not a dead letter it seems by no means to have resulted in a rapid change of grade crossings. But in 1889 the Legislature enacted a bill similar to the one which had passed the House and been rejected by the Senate at an earlier date. Among the provisions of this new law¹⁸ was one which made it the duty of the railroad directors to petition for the removal every year of at least one grade crossing for each 60 miles of road operated by it in the State, designating in their

¹⁴ *Ibid.*, 1886, p. xxv of Statutes.

¹⁵ *Ibid.*, 1886, p. 7.

¹⁶ *Ibid.*, 1887, p. 30.

¹⁷ *Ibid.*, 1887, p. 37.

¹⁸ Public Acts 1889, c. 220. The text of the law reads as follows:

"The directors of every railroad company which operates a railroad in this State shall remove or apply for the removal of at least one grade crossing each year for every sixty miles of road operated by it in this State, which crossings, so to be removed, shall be those which in the

opinion of said directors are among the most dangerous ones on the lines operated by it, and if the directors of any railroad company fail so to do, the Railroad Commissioners shall, if in their opinion the financial condition of the company will warrant, order such crossing or crossings removed as in their opinion the said directors should have applied for the removal of under the above provisions, and the Railroad Commissioners in so doing shall proceed in all respects as to methods of procedure and assessment of expense as if the said directors had voluntarily applied therefor."

petitions the crossings they deemed most dangerous. In case the directors failed to ask for such removal the Railroad Commission was required, if the members thought the financial condition of the road warranted, to order the removal of those crossings for the removal of which in their judgment the directors should have applied. If the highway in question had been constructed before the railroad, $\frac{3}{4}$ of the expense for grade removal should be assessed against the railroad; if the railroad had been in existence before the construction of the highway, then only $\frac{1}{2}$ the cost was to be paid by the railroad.

Notwithstanding its advocacy of a law compelling the elimination of a stated percentage of crossings annually, the Commission appears to have felt some disappointment at the enactment of the 1889 statute which it characterized in 1890 as "an act not at all calculated to hasten the elimination of any considerable number of these so-called 'death traps.'"¹⁹ It looks as though the Commission were disappointed that the law had not been more stringent. Public sentiment had not crystallized so completely upon the necessity of change as had the opinion of the members of the Commission. As to the effectiveness of the grade crossing laws of 1849 and 1870, the Commission mentions in 1890 "the efforts of the communities through which new railroads were to be built to prevent any change in the highways which the avoidance of such crossings would require . . ."²⁰ The lethargy or positive opposition of the public continued for some time. In 1894 the Commission reports, "This legislation [of 1849] was, however, in advance of public sentiment, and for thirty years individuals

and municipalities more often urged the construction of local crossings than opposed them, and restriction was practically a dead letter."²¹ The burden of taxes to pay the community's share of the cost apparently loomed more important in the minds of the people than did the hazards of grade crossings.

In 1890 the railroad mileage in the State was such as to compel only four companies to remove crossings under the new law. These roads would be expected to remove six, four, two, and one, respectively. The New York, New Haven and Hartford Railroad, the longest one, was the only one to comply fully with the terms of the law. In this case, however, the changes were made not as a result of the new law but in carrying out a policy of eliminating all grade crossings on its main line.²² The road required to remove one crossing a year did complete its obligation shortly after the end of the year and was in process of removing another crossing.²³ The Commission did not feel confident that the financial condition of the New York and New England Railroad justified a compulsory removal without a hearing on the matter. Hence it assigned a hearing for the removal of a crossing in Bristol. Before this case was heard at a postponed date the company had requested the removal of six other grade crossings in the State. It contended that these other removals had completed its obligations under the statute. Also, it contended that crossing elimination in Massachusetts had meant a financial strain such as to warrant no additional change in Connecticut at that time.²⁴ The Commission refused to take the last argument into account and the matter was left pending at the close of the year.²⁵ Subsequently the Commission

¹⁹ Report Conn. R. R. Com. 1890, pp. 27-28.

²⁰ *Ibid.* 1890, p. 27.

²¹ *Ibid.* 1894, p. 4.

²² *Ibid.* 1890, pp. 27-28.

²³ *Ibid.*, p. 28.

²⁴ *Ibid.* 1890, p. 29.

²⁵ *Ibid.*

did order the elimination of this crossing.²⁶ This case became the subject of litigation to be noted presently.

The Housatonic Railroad had a quota of two crossings a year to be removed. The Commission ordered a hearing on the removal of a dangerous crossing in Bridgeport but the railroad and the community joined in a request that the matter be postponed pending the decision on some relevant developments.²⁷ No further action concerning this road was taken by the Commission during the first year of the operation of the law.

In view of the fact that the Bristol case was the only one in which for five years following the passage of the law the Commission had tried to carry out the provisions giving it the right to take the initiative in grade crossing removal²⁸ and in view of the further fact that the railroad contested the rights of the Commission in this respect, it is interesting to follow the case through the courts. Difficulty was had from the beginning because the order of the Commission was not satisfactory to the railroad or to the city and the Commission was forced to answer the appeal in its own behalf.²⁹ This led to a recommendation for a change in the law whereby the State's Attorney was to answer in case of appeal, thus relieving the Commission of the embarrassment of appearing first as a court and then later as a party to the litigation.³⁰

As indicated above, the New York and New England Railroad Company appealed to the Superior Court against the order to remove the Bristol crossing. Among other items the plaintiff's contention maintained that the commissioners were not entitled to defend; that

the statute was unconstitutional; and that certain errors had been made in the rejection of evidence. The decision of the court was rendered in March, 1893, and was a complete victory for the Commission,³¹ as indicated by the following statement.

"It being established by the Legislature and by repeated decisions of this court that grade crossings are in the nature of nuisances and dangerous to life, the right of the Legislature to cause them to be abated and to require either party to pay the whole or any portion of the expense cannot be questioned."

Also, the appearance of the Commissioners to answer and defend the case was clearly conferred upon them by the law;³² further, the railroad was protected by the right of appeal. The statute in question was a legitimate exercise of the police power of the State and it operated as an amendment to all railroad charters that had been granted.

Thereupon the railroad appealed the case to the United States Supreme Court. On February 5, 1894, this Court gave its decision affirming the conclusions reached by the Connecticut Supreme Court.³³ Chief Justice Fuller held the law a valid exercise of the police power of the State; that it constituted an amendment to railroad charters in accordance with rights reserved by the State; that railroads were subject to control by the Legislature for the protection of the public interest and that such control might be exercised by a Commission; no unjust discrimination or denial of equal protection of the laws resulted if the act applied to all railroads alike; and assessment of the expense against the railroad was not a deprivation of property without due process of law.

²⁶ *Ibid.* 1891, p. 24.

²⁷ *Ibid.* 1890, p. 30.

²⁸ *Ibid.* 1894, p. 27.

²⁹ *Ibid.* 1891, pp. 24-25.

³⁰ *Ibid.* 1892, p. 27; *ibid.* 1891, p. 25.

³¹ *Ibid.* 1893, pp. 49-60 (*N. Y. & N. Eng. R. R. Co. v. R. R. Commissioners*).

³² *Ibid.*, p. 59.

³³ *Ibid.* 1894, pp. 38-49.

This blanket decision settled once for all the constitutional questions raised by the statute and no case has been brought to test the law since that date. The recent litigation in Connecticut does not involve the validity of the law in question, but only the wisdom of the discretion exercised by the Commissioners in applying the statute. The repeal of the law by the 1931 session of the Legislature removes the possibility of further litigation once the case now in the courts is settled. So far as the records show, this is the only case, prior to the present litigation, in which action taken by the Commissioners in the removal of grade crossings has been the subject of litigation.

Before 1889 the removal of grade crossings required some expense on the part of the town or municipality in which the crossing was located. It has been noted that the necessity of meeting this cost resulted in reluctance on the part of local authorities to initiate proceedings looking to elimination. The Railroad Commissioners had called attention frequently to this handicap and had suggested modification of the law. Also, highways had become less local and more like a trunkline even before the advent of the automobile. The Legislature, therefore, in the act of 1889 authorized the Commission to take the initiative in the proceedings to remove crossings, when they deemed it necessary, and made a change in the allocation of the cost incurred. In cases in which the Commission took the initiative it could allocate the expenses between the railroad company and the State, rather than between the company and the local government. Not more than $\frac{1}{4}$ of the

cost of the improvement could be assessed against the railroad in such cases.³⁴

The law of 1889 also made a change in the allocation of cost when the town or railroad applied to have grade crossings removed. If the application came from the railroad, the company should pay the entire expense; if it came from the town, $\frac{1}{4}$ of the cost was to be borne by the town if the highway had been built before the railroad and not more than $\frac{1}{2}$ the expense in those cases in which the railroad had been constructed before the building of the highway. Naturally, this law was not calculated to induce the railroads to take the initiative in removing grade crossings. The new law, quite consistently, provided reimbursement under certain conditions to the towns for the expense met in the removal of crossings since 1885. For this purpose \$26,028.80 was paid to nine towns.³⁵

In 1893 the Legislature went a step farther and empowered the Commission to eliminate private grade crossings when public safety, in their judgment, required.³⁶ The Commission, following this enactment, said that the sole barrier to the complete removal of grade crossings lay in "the inability of the company to pay the cost of their removal."³⁷

Street Railway Crossings. The laws enacted up to 1889 had to do primarily with grade crossings of highways and steam railroads. In 1883 or 1884, however, a bill was introduced in the Legislature to forbid the construction of street railways at grade across railroads. This bill did not pass but in 1889 such a proposal was enacted. The Railroad Commission approved this law, saying

"No disinterested person will deny that electric cars are more dangerous than horse cars; they are run at much greater speed, are much heavier and are more liable to

³⁴ Public Acts 1889, c. 220, §2.

³⁵ Public Acts 1893, c. 252; Report Conn. R. R. Com. 1893, p. 30.

³⁶ Public Acts 1893, c. 263, §2.

³⁷ Report Conn. R. R. Com. 1893, p. 45.

unexpected stops, and when derailed are more difficult to be placed in position, and are run more frequently."³⁸

In spite of the forward move taken in 1889, a backward step was made in 1893.³⁹ Then an amendment was enacted to the effect that no grade crossing by a steam railroad and an electric railway should be permitted save upon application to and approval by the Railroad Commission. The Commission regarded this as an unfortunate reversal of position but concluded that it had no alternative but to permit grade crossings where no special reasons existed to the contrary.⁴⁰ Whether this law was the result of pressure brought to bear upon the Legislature by special interests or whether it was simply a careless act not fully considered at the time does not appear certain. The Commission attributed the lapse to the political influence of the street railway people.⁴¹ At any rate, the Commission urged a repeal of the permissive feature. And, if retained, it suggested that the Commissioners, upon declining to permit a crossing at grade, should be instructed to apportion the cost between the local government, the railroad, and the street railway.⁴²

The Commission in 1894 was of the opinion that its known attitude of disapproval had resulted in fewer applications from the street railways than would have come otherwise.⁴³ Again, they urged the Legislature to repeal the law which they regarded as inconsistent with the general policy of grade crossing removal. They predicted that the special interests would make a further effort to have the General Assembly enact laws facilitating the making of grade

crossings. "We believe such action ought not to be taken . . . better to prohibit absolutely [such crossings]".⁴⁴ In 1895 the Legislature adopted the recommendation of the Commission and passed a law⁴⁵ prohibiting in the future the construction of any grade crossing between steam railroads and electric or cable or horse-drawn railways. The Legislature further enacted that the Commission could order the separation of grades of electric and steam railroads at crossings in the same manner in which they were authorized to require separation for highways and steam railroads.

Although the law had gone far in requiring the removal of danger at grade crossings, the Railroad Commission in 1906 asked further legislation. They wanted the power to require that abutments be set back, that bridges be widened, and approaches to crossings be altered so as to further safety.⁴⁶ In 1907 the Legislature gave the Commission the right to order the removal for a distance of 150 feet from a railway crossing of any obstruction to sight.⁴⁷

Success in Elimination of Crossings. It has already been seen that the Commission did take the initiative, as authorized by the law of 1889, in the removal of one grade crossing during the first five years after the passage of the law. In the Bristol case the courts gave complete support to the Commission in the application of the law. Yet, in 1906, the Commission confessed that grade crossings had not been removed as rapidly as the law required.⁴⁸ It must be recalled, however, that the Commission was given some discretion as to whether the financial condition of the railroads warranted

³⁸ *Ibid.* 1893, p. 4.

³⁹ Public Acts 1893, c. 208.

⁴⁰ Report Conn. R. R. Com. 1893, pp. 5-6.

⁴¹ *Ibid.* 1894, p. 4.

⁴² *Ibid.* 1893, p. 6.

⁴³ *Ibid.*, p. 5.

⁴⁴ Public Acts 1895, c. 2.

⁴⁵ Report Conn. R. R. Com. 1906, p. 5.

⁴⁶ Public Acts 1907, c. 224.

⁴⁷ Report Conn. R. R. Com. 1906, p. 24.

the removal of one crossing for every 60 miles of road. In 1894 the financial status of the roads was indicated as the reason for the removal of only six and two crossings for railroads which according to their mileage would be expected to apply for the removal of twenty and five, respectively.⁴⁹

Apparently no serious hardship had resulted from the prohibition upon the construction of new grade crossings. "For ten years our laws have prohibited the construction of new highways at grade across steam railroads, but we have never heard a complaint that it had unreasonably interfered with the laying of new highways."⁵⁰ The chief difficulty, naturally, arose in the changing of crossings already constructed.

In its report for 1909, is found a general summary of the grade crossing status in the State and the changes in the 20 years following the enactment of the 1889 law. In 1889 there were 1,494 highway crossings in the State, 1,193 of which crossed at grade. Of the 1,193 grade crossings 68 had been discontinued and 299 had been eliminated in one way or another, leaving 894 crossings at grade. This meant an annual average of 15 eliminations, whereas the statute called for 16 on the basis of the existing railway mileage.⁵¹ At the time of making the report orders had been issued for the elimination of 55 additional crossings. Hence, the terms of the act had been complied with in full.⁵² No grade crossing remained on the road between New York and New Haven and only seven were left between New Haven and New London.⁵³

There can be no doubt as to the wisdom of the legislative policy of grade crossing elimination which Connecticut began as early as 1849 and which was

made more aggressive by the law of 1889. In general, whether the initiative was taken by the local governmental authorities or by the railroads, the record of accomplishment for the 60 years from 1849 to 1909 is a creditable one. But the record leaves one in doubt as to whether the provisions of the 1889 law, giving to the Commission a mandate for the removal of one crossing for each 60 miles of road annually, was a significant factor in the changes made. Possibly the knowledge that such a requirement existed served as a stimulus to cause the roads to apply for the elimination of crossings that otherwise would have been continued. But this inducement to apply was offset in part by the provision that in those cases in which application was made by the railroad the entire expense was to be borne by the road. It cannot be shown that the Railroad Commission took the initiative as directed by the law in causing the elimination of any large number of crossings. The financial condition of the roads was partly responsible for this inaction, but elimination under the provisions of other statutes seems to have been the more important factor. Whatever cause may be assigned for the successful elimination of grade crossings, the total result over a period of years, as revealed by the record, was a good one. And it is to be noted with commendation that the State and the Federal courts did not place any barrier in the way of the attainment of the desired end, but rather that they gave definite and unqualified sanction to the social policy expressed by legislative enactment and the administrative action following thereupon. It is pertinent to examine next the grade crossing elimination problem as it has

⁴⁹ *Ibid.* 1894, p. 26.

⁵⁰ *Ibid.* 1893, p. 7.

⁵¹ *Ibid.* 1909, p. 4.

⁵² *Ibid.*, p. 5.

⁵³ *Ibid.*

been handled under the jurisdiction of the Public Utilities Commission.

The Public Utilities Commission and Grade Crossings

By legislative enactment of 1911 Connecticut established a Public Utilities Commission which included in its powers those formerly held by the Railroad Commission.⁵⁴ At the same time a slight change was made in the provisions of the 1889 law for the removal of grade crossings.⁵⁵ Instead of the removal of one grade crossing to each 60 miles of road the new statute made 50 miles the basis. The initiative formerly vested in the Railroad Commission in securing such removal was transferred to the Public Utilities Commission, now clothed with all the powers formerly held by the Railroad Commission to carry out the provisions of the law. There is no evidence that any opposition was felt to the substitution of 50 miles for the 60 miles that had been the basis for removal in the earlier law. The change seems to have been an expression of a continuing policy to bring about the desired result and this law, as had the one preceding it, marked a further step in the movement to accelerate grade crossing elimination. Also, as noted in another connection, the change would make the law apply to the Central Vermont Railway, a company operating less than 60 but more than 50 miles in the State. The new law reveals a renewal of the legislative recognition of the hazards at grade crossings and a determination, under the police power of the State, to promote the public safety.

Another pertinent provision of the 1911 law reads:

"Misconduct, material neglect of duty, incompetency in the conduct of his office, or active participation in political management or campaigns by any commissioner shall con-

stitute cause for removal. Such removal shall be made only after judgment of the superior court rendered upon complaint of the attorney-general. The attorney-general may file such complaint in his discretion, and shall file such complaint if so directed by the Governor, or if so requested in writing by one hundred electors of the State. Upon the filing of such complaint a rule to show cause shall issue to the accused, who may make any proper answer within such time as the court may limit, and shall have the right to be heard in his own defense and by witnesses and counsel. The procedure upon such complaint shall be similar to that in civil actions, but such complaint shall be privileged in order of trial, and shall be heard as soon as practicable. If, after hearing, the court shall find cause for removal, it shall render judgment to that effect, and thereupon the office of such commissioner shall become vacant; if the court shall find no cause for removal it shall dismiss the complaint."

There is reason to believe that the accomplishments of the Public Utilities Commission in effecting the removal of grade crossings have fallen somewhat short, in so far as the actual number eliminated is concerned, of the record of the Railroad Commission. This failure to maintain the record may well be attributed to a change of conditions for which the new Commission was in no-wise responsible. First, the cost of changes increased greatly with advancing prices. Also, the advent of the automobile made the modification of over and under passes frequently more important than the elimination of grade crossings, as such. In the meantime, supplementary legislation had enabled the Commission to insist upon the installation at crossings of various safety devices the use of which removed the danger even though they did entail some delay from the closing of gates and the stopping of highway traffic. Perhaps the most significant force operating against the removal of a large number of crossings

⁵⁴ Public Acts 1911, c. 128.

⁵⁵ *Ibid.*, c. 196.

was the changed financial condition of the railroads and the conclusion of the Commission that the additional expense was not warranted under prevailing circumstances.

The railroad mileage in the State did not change materially after the creation of the Public Utilities Commission. In 1912, according to the provisions of the statute, 19 crossings should be removed annually but during that year nine crossings were eliminated and applications were approved for the removal of 23 additional ones.⁵⁶ For the year ending June 30, 1913, the Commission approved applications and issued orders for the elimination of 15 grade crossings.⁵⁷ Not until 1914 did any dark cloud appear upon the horizon of grade crossing removal. At that time the New York, New Haven and Hartford Railroad applied to the Commission for a suspension of the outstanding orders for removal. Seven hundred and ninety-three grade crossings then existed in the State. The Commission, upon hearing, determined that the financial condition of the railroad warranted a temporary suspension of the orders and therefore relieved the company of compliance with 31 decrees already given.⁵⁸ This suspension was continued for the following year.⁵⁹ Again, in 1916, suspension was approved and only three crossings were removed. The Commission acted upon a conviction that the financial condition of the railroads was poor but it expressed the hope that, in view of the increased hazard from the operation of automobiles, elimination might be continued the following year.⁶⁰

This hope was blasted through war conditions and the Commission made no

attempt to carry out the provisions of the law. It did, however, cooperate with the Highway Commissioner in a campaign to educate the public as to the meaning of signs at crossings and the need for caution.⁶¹ That the Commission did not feel satisfied with the status of things is revealed by a letter sent to the president of the New Haven Railroad on August 5, 1922.⁶² His attention was directed to the provisions of the statute and to default in the removal of 146 grade crossings. Admitting the precarious financial condition of the road, the Commission suggested that steps be taken immediately for the removal of one or more of four dangerous crossings specified in the letter.

Upon petition of the railroad the Commission again in 1922 granted relief from compliance with the terms of the law.⁶³ The Commission indicated that the road could not be expected to comply literally with the terms of the law as to the exact number of crossings to be removed in any particular year. Engineering problems and delay in condemnation proceedings necessitated the averaging over a period of years in crediting the company with removals. As to the financial condition of the road, it was admitted that the purchase of new steel cars, the installation of signal devices as required by the Commission, and the rebuilding of bridges were more likely to promote public safety than would be a literal application of the law. Wage increases and the purchase of heavier engines to haul the new steel cars, the consequent renewal of rails and ties and improvement in the roadbed, the expense of electrifying the road from New York to New Haven, and the difficulty

⁵⁶ Report Conn. P. U. Com. 1912, p. xxi.

⁵⁷ *Ibid.* 1913, p. viii.

⁵⁸ *Ibid.* 1914, p. 10.

⁵⁹ *Ibid.* 1915, p. 6.

⁶⁰ *Ibid.* 1916, pp. 12-13.

⁶¹ *Ibid.* 1918, p. 7.

⁶² *Ibid.* 1922, pp. 10-11.

⁶³ Doc. No. 1107.

the company had in securing funds for betterments all were relevant considerations in the opinion of the Commission.

The Chairman of the Commission, in a memorandum attached to this decision, gave a summary of grade crossing elimination from 1901 to 1919. From 1901 to 1911 the company had removed 184 instead of the 165 crossings as required by the law; from 1901 to 1919 it had eliminated 195 rather than the 199 as required, thus for the period showing an arrearage of four. But from 1911 to 1913 the company had eliminated only 11 out of the 34 crossings required and in 1913 it removed only 4 rather than the legal quota of 17.

In a supplemental order of December 28, 1924, the Commission indicated an arrearage of 147 eliminations up to January 1, 1923. It remarked upon failure to require the railroads to act:

"This Commission has exercised the discretion invested in it by Section 3710 and in view of the serious financial condition of the company has not for a number of recent years enforced the annual number of eliminations of grade crossings provided therein."⁶⁴

In its annual reports for 1928, 1929 and 1930 the Commission has made an extensive survey of the work in the removal of grade crossings. From 1912 to 1929, inclusive, 88 crossings have been eliminated or were in process of elimination at the time of the 1930 report. Also, there were 26 crossings which, in effect, had been eliminated by the cessation of train movements over certain railroads, thus giving an effective removal of 114 crossings.⁶⁵ In 1930, 686 crossings remained at grade. Since 1884 there had been a removal of 537 grade crossings. At the 686 grade crossings remaining the roads had installed, by order of the Commission, gates, flagmen, or automatic

signals at 285. In all but 11 of this number the protection was given for 24 hours daily.

In 1930 the New York, New Haven and Hartford Railroad and the Central Vermont Railway were the only two companies affected by the requirement that one crossing be removed annually for every 50 miles of road in the State. For 10 years the latter road had been in the hands of receivers and a like fate had been narrowly averted by the former.⁶⁶ The Commission notes with gratitudo that only five states in the United States have a smaller number of grade crossings than does Connecticut. The five states, however, were the small ones of Delaware and Rhode Island and the sparsely settled states of Nevada, Vermont, and Wyoming. Connecticut, as one of the smallest states, would obviously have fewer grade crossings than the larger states.

Reasons for Failure of the Commission to Compel Action

The chief reason for the failure of the Public Utilities Commission to adopt a more aggressive policy in bringing about the removal of grade crossings was, as already noted, a conviction that the financial condition of the roads did not warrant a literal application of the terms of the law. It is recalled that this law made the removal of the stipulated number of crossings subject to the exercise of discretion by the Commission on the matter of the financial ability of the roads. The most severe criticism that can be brought against the Commission, therefore, is the charge that their discretion was not used wisely and in the public interest. The critics of the Commission can find evidence to show that it did not always accede to the request of the railways that they be relieved

⁶⁴ Doc. No. 3988, pp. 4, 5.

⁶⁵ Report Conn. P. U. Com. 1930, p. 4.

⁶⁶ *Ibid.* 1930, p. 6.

from the operation of the law on account of their poor financial condition.

A case in point arose in 1913.⁶⁷ The Central Vermont Railway Company, operating by lease 56 miles of road in the State, applied for relief on the ground of its financial condition. The road claimed that in 1912 it had operated the leased line, the New London Northern Railroad Company, at a loss of \$123,413.47 and that on all its lines it had only a very small net profit and paid no dividends on common stock. The Commission did not grant the petition for relief for two reasons. First, the New London Northern Road, to which Connecticut had given a charter, had less than 60 miles of railway in the State and had not come within the operation of the law before the change made in 1911. For the 10 years ending in 1918 the company had removed only two grade crossings in the State. Further, even though the Central Vermont did not make large profits, it had found the leased line sufficiently valuable to pay to the owners of the stock of the leased line a dividend of 9% as rental, and also the New London Company had an accumulated surplus of more than half a million dollars. It is quite apparent that in this case the Commission looked beyond the appearance of things to their reality and rendered a decision on the basis of the requirements of public safety.

In another case⁶⁸ the Commission gave a somewhat different reason for refusing to grant the petition that a grade crossing be removed. It called attention to the enormous expense involved in the elimination of all grade crossings; indicated that the crossing in question was protected by 24-hour gate service and hence was not especially dangerous.

The chief reason for a change lay in a desire to promote public convenience in the prevention of delay incident to the closing of gates. But the funds devoted to the change in question would thus be diverted from necessary improvements in railroad property and service.

"In this respect the numerous improvements planned by the company relate in large part to the factor of public safety. The evidence clearly shows that the elimination of these crossings cannot be carried out without foregoing some necessary improvement."

The grade crossing menace had been somewhat lessened by legislation of 1917 giving additional powers to the Commission.⁶⁹ This law required local government officials to erect and maintain at all grade crossings designated signs to be supplied by the railroad company. This was mandatory unless excused by the Commission. Furthermore, the Commission was authorized to require at grade crossings such signs as it deemed necessary and to require that signs be lighted at night or be accompanied by red warning lights. The Commission could require railroad trains to come to a full stop at crossings as it thought necessary. The enactment of this law was apparently in response, in part, to one of the recommendations made by the Commission in 1916.⁷⁰

A relevant consideration also is the great change that has taken place since 1889 in the mode of highway travel. At the earlier date relatively slow-moving, horse-drawn vehicles were used. Many of the crossings had been eliminated by the construction of "narrow, winding, under or overhead highway passes, considered reasonably safe for . . . that date."⁷¹ The advent of the automobile,

⁶⁷ Doc. No. 687.

⁶⁸ Doc. No. 1087.

⁶⁹ Public Acts 1917, c. 373.

⁷⁰ Report Conn. P. U. Com. 1916, p. 15.

⁷¹ *Ibid.* 1929, p. 5.

according to the Commission, had changed the situation so that public safety demanded the removal of dangerous conditions at grade crossings, as such. From 1924 to 1929 dangerous conditions were removed, by order of the Commission, at 11 crossings where grades had already been separated.⁷²

Recent years have shown a change in the initiative in the removal of grade crossings in Connecticut. At the time of the enactment of the 1889 statute and other early laws, all highway traffic was primarily local. Hence, it was provided that the local government authorities and the railroads, the two groups having a direct interest in removing grade crossings, could take the initiative in such proceedings. Legislation of 1889 authorized the Railroad Commission, later the Public Utilities Commission, to take the initiative in the removal of grade crossings and to assess the expense $\frac{1}{4}$ to the State and $\frac{3}{4}$ to the railroad company. That the Public Utilities Commission gradually decreased the number of cases in which it took the initiative has been noted in several connections heretofore. Even more notable was the diminution of cases in which the municipalities assumed the initiative in making a petition. In the five-year period from 1925 to 1930 not one petition for elimination had been brought by a municipality.⁷³ Whence, then, came the initiative in the removal of such crossings?

In its report for 1928 the Commission indicated that six grade crossings had been ordered removed by it during the year and dangerous conditions at six other non-grade crossings had been ordered changed. In all these cases the action had been begun by the State

Highway Commissioner.⁷⁴ In 1930 the Commission says "the majority of grade crossing eliminations in recent years have been initiated by petitions of the State Highway Department."⁷⁵

This situation suggests a changed procedure for which legislative sanction had been given. In 1915 the Legislature enacted a law⁷⁶ giving the Highway Commissioner, in case he and the railway officials and the municipal authorities could not agree upon the removal of a dangerous condition at a railway crossing, the right to petition to the Public Utilities Commission for such change. The Commission was instructed to order a change where necessary and to apportion the expense equitably between the company, the municipality, and the State. Any aggrieved interest could appeal from the decision of the Commission to the Superior Court. The scope of this law was somewhat enlarged in 1925 by the enactment of a law⁷⁷ which gave to the municipality as well as to the Highway Commissioner the right to appeal to the Utilities Commission for an order to remove dangerous conditions at railroad crossings.

The latitude given the Commission in the apportionment of the cost incurred in grade crossing elimination is in marked contrast with the provisions of the earlier statutes. In 1922 the Commission had recommended that the Legislature change the allocation of costs of grade crossing elimination in those cases in which the work was done under the law requiring the removal of one crossing each year for every 50 miles of road.⁷⁸

"Owing to the present volume, speed and character of highway travel, and the decreasing number of train movements and financial

⁷² *Ibid.*

⁷³ *Ibid.* 1930, p. 5.

⁷⁴ *Ibid.* 1928, p. 5.

⁷⁵ *Ibid.* 1930, p. 5.

⁷⁶ Public Acts 1915, c. 223.

⁷⁷ *Ibid.* 1925, c. 266.

⁷⁸ Report Conn. P. U. Com. 1922, pp. 16-17.

condition of the railroads, we call attention to the equity if not the necessity of the State's taking a more active financial cooperation in the elimination and protection of grade crossings and the safe-guarding of human life."

This is the only instance found in which the Commission recommended a modification of this law from the time it came into existence until it was repealed by the Legislature in 1931. One notable observation on the work of the Connecticut Commission is the infrequency with which it has taken the lead in calling for a modification of the laws under which it operates. But the recommendation in this case did not lead to action.

The Commission has attempted in the allocation of costs to consider the circumstances surrounding each case and to assess the expense as it thought equitable. No set formula has been used as can be seen by reference to two decisions. In 1925⁷⁹ in the change from a grade crossing in the town of Plainfield, after deducting a small sum for preliminary work to be done by the State, the Commission allotted the cost: 3% to the town; 45% to the railroad company; and 52% to the State. In 1927, in another case, indicating that the railroad company did not derive any direct benefit from the change required at an existing underpass, the Commission assessed the cost: 66 $\frac{2}{3}$ % to the State and 33 $\frac{1}{3}$ % to the railroad.⁸⁰

The inference is not to be drawn that the Commission has at all times concurred in the recommendations of the Highway Commissioner for the removal of dangerous conditions at crossings. In 1926 the Commission denied a petition of the Highway Commissioner for the elimination of a crossing in Andover.⁸¹ In its conclusion it held:

⁷⁹ Doc. No. 4518.

⁸⁰ Doc. No. 4868.

⁸¹ Doc. No. 4731.

"that while a dangerous condition exists at the aforesaid crossing, the degree of danger is confined to that incidental to grade crossings generally and not such as to warrant its elimination on a plan which would disintegrate the town, especially when the proposed trunkline highway can be constructed along the proposed line without abolishing the local crossing."

Another illustration of the Commission's independence of Highway Department influence was given in a 1928 decision.⁸² The Commission concluded that the elimination was not warranted because of the expense and

"the separation or isolation of local interests, and the damage to property, which the construction of an overhead highway as contemplated would entail, still leaving an important crossing at grade only a few hundred feet away."

To get a complete picture of the powers of the Public Utilities Commission in insuring protection at grade crossings, it is necessary to note new legislation of 1929. The Legislature then passed a law⁸³ authorizing the Commission, upon petition and hearing, to order the elimination of any private crossing of a railroad if public safety necessitated. The Commission was to lay out a new highway, if the owner's land was not otherwise connected with a public highway, and to assess the cost equitably upon the interested parties. If an over or an underneath crossing were ordered, the entire cost was to be borne by the railroad. Another law⁸⁴ called upon the Commission to make a study of all grade crossings and to determine whether people traveling on the highway should come to a complete stop before crossing; also to require the railroad company to erect suitable signs at such crossings. A third law of that session authorized the

⁸² Doc. No. 5042.

⁸³ Public Acts 1929, c. 17.

⁸⁴ *Ibid.*, c. 216.

Commission, upon petition and hearing or upon its own initiative, to order the erection of gates or suitable signs, or the placing of flagmen at grade crossings, or to take any other action needed for the protection of the public.

This Legislature repealed the requirement for removal of one grade crossing each year for every 50 miles of road operated in the State.⁸⁵ Also, it repealed that section of the public utility law giving to 100 electors of the State the right to instruct the attorney-general to bring ouster proceedings against the commissioners for neglect of duty.⁸⁶ In both cases the law indicated that no change was to be made in any litigation brought under the earlier statutes and in process at the time of the repeal acts. Governor Cross vetoed the second of the above acts, depriving the electors of the means of forcing the attorney-general to bring action, but the Legislature promptly passed the proposed measure over his veto.

On October 22, 1929, a petition had been presented to the attorney-general, in writing and signed by more than 100 electors, asking him to institute proceedings against the members of the Commission for their failure to insist upon removal of the number of grade crossings as required by law.⁸⁷ The petition alleged that there were 944 miles of railroad track in the State and that consequently the law required the removal of at least 18 crossings each year. Further, the Public Utilities Commission was cited as authority for an estimated cost of \$150,000 for the removal of a crossing. Thus 18 eliminations a year would have cost \$2,700,000. The earnings of the

railroads affected were shown from the reports of the Commission to have been:

Year	Amount
1925.....	\$ 6,836,367.76
1926.....	8,737,280.55
1927.....	9,102,132.36
1928.....	17,607,889.28
Total.....	<u>\$42,283,669.95</u>

During this period (1925-8) no crossing had been removed through the initiative of the Commission as prescribed by the law in question. Had the stipulated number of crossings been removed the railroads would have retained as net profits for 1925 more than \$4,000,000; for 1926 more than \$6,000,000; for 1927, \$7,000,000; and for 1928, over \$14,000,000. Under such circumstances it was claimed that failure to require the grade crossing removals constituted neglect of duty calling for ouster proceedings against the Commission.⁸⁸

On December 3, 1929, the attorney-general declined to bring action on the ground that he did not consider the facts such as to warrant it. Thereupon, Albert Levitt, one of the petitioners, appealed to the court for a mandamus forcing the attorney-general to institute proceedings. To this plea the attorney-general answered that action on his part, in case of such petition, was discretionary and not mandatory; that the petition in question did not show on its face that the commissioners had abused their discretion; that it was doubtful whether the removal of an administrative officer could be delegated to the judicial department. Also, he reviewed in detail the financial condition of the railroads, and the work of the Commission in the removal of grade crossings. It was shown that the New Haven Railroad did not pay any dividends from 1914 to 1927 and that in 1928 for the first time since 1914

⁸⁵ Public Acts 1931, c. 12.

⁸⁶ *Ibid.*, c. 14.

⁸⁷ State of Conn. Supreme Court of Errors, *Albert Levitt v. Attorney General, Hartford County*, Doc. No. 1435, p. 4.

⁸⁸ *Ibid.*, p. 5.

the road paid a dividend of 3% on its common stock. During this entire period the road was threatened with receivership. Furthermore, the development of motor traffic had changed the situation materially. The Highway Commissioner was authorized by law in 1915 to apply for the removal of dangerous conditions at crossings. Many of the over and under passes constructed in an earlier period before the development of motor traffic were more dangerous than grade crossings protected by automatic signals and gates. During the period covered by the petition, 37 grade crossings had been eliminated, most of them through the initiative of the Highway Commissioner. In addition, 11 orders had been issued for the removal of dangerous conditions where the highway did not cross the railroad at grade. Six crossings had been eliminated by voluntary agreement with the railroads. All these changes, the attorney-general contended, should be credited to the maximum number to be eliminated under the law invoked by the petitioners. Also, the expense involved in the changes should be considered in the light of the financial condition of the railroads. The attorney-general had a responsibility to protect the traveling public, investors in railroads, and those dependent upon railroads for service.

On February 4, 1930, Judge Jennings handed down a decision granting the petition for a mandamus to force the attorney-general to bring action against the commissioners. The law under which the petition was brought did not leave action to the discretion of the attorney-general.⁸⁹ Hence a peremptory writ was issued against the attorney-general that he file a complaint before March 20, 1930,

calling for the removal of the Public Utilities Commissioners from office.

It will be observed that this decision did not determine anything as to the merits of the action against the Commissioners; it settled solely the question as to the necessity of having proceedings instituted by the attorney-general. From the decision of Judge Jennings the attorney-general appealed to the Supreme Court of Errors.⁹⁰ In appealing he claimed that the law under which the petition was brought constituted a violation of the fourteenth amendment to the United States Constitution, in that it permitted the removal from executive office by the judicial branch of the government; also, only the Governor, for reasonable cause and upon hearing, could remove an official appointed by him. To the first contention the court answered that the law did not delegate the power of removal to the superior court but it "finds the facts constituting 'material neglect of duty' and the Legislature prescribes that it shall then render judgment to that effect and that the office shall thereupon become vacant."⁹¹ To the second contention the court said,

"The Public Utilities Commission was created by the General Assembly. The power which creates has the power to remove, in the absence of constitutional or statutory provision to the contrary, of which there was none in this State at the creation of the Commission."⁹²

To the major contention of the attorney-general that the bringing of proceedings was discretionary with him, the court said:

"When the written request of one hundred electors of this State is presented to the attorney-general, and it does specify one of the statutory grounds for the removal of the commissioners and also specific facts, not

⁸⁹ *Ibid.*, pp. 23-25.

⁹⁰ *Levitt v. Attorney General of Conn.*, 111 Conn. 634 (1930).

⁹¹ *Ibid.*, p. 647.

⁹² *Ibid.*, p. 648.

manifestly untrue, which tend to support this charge, however inartificially it may be stated, the duty of the attorney-general is a plain one. He must obey the mandate of the statute and since it is a public action and he charged with the duty of conducting such actions he must, to the best of his ability, fulfill this public duty, as attorney-general, and his duty as a lawyer to protect the interests of his client, the people of the State."⁹⁴

As to the financial exhibit made in the petition the court held:

"These allegations assuredly make out a *prima facie* case of the financial condition of the railroads during the years which would warrant the Commission ordering the removal each year of the eighteen crossings a year."⁹⁵

Subsequent to the decision, rendered in May, 1930, the attorney-general asked a re-opening of the case. The plea was in the main a technical one—namely, that the lower court issued its order without consideration of "vital issues;" that the allegations made in the petition were "manifestly untrue." On this plea the Supreme Court said:

"By the expression 'manifestly untrue' we meant allegations the untruth of which appeared upon the face of the request or was readily apparent from an examination of authoritative sources of information, but not those the truth of which had to be determined by the weighing of evidence or the credibility of witnesses, or the balancing of facts and circumstances or by process of inference or deduction . . . "⁹⁶

Thereupon the case was remanded to the lower court. Having tested in vain every means whereby he might be relieved of bringing action against the Public Utilities Commissioners, the attorney-general on April 23, 1931, filed a complaint against the members of the Commission, compelling them to show cause why they should not be removed

from office for failure to apply the law as to the elimination of grade crossings."⁹⁷

On July 13, 1931, Judge Baldwin rendered his decision in favor of the Public Utilities Commission.⁹⁸ His analysis of the issues involved, taking into account the financial condition of the New Haven Railroad and the significance to the State of its solvency, led him to a complete vindication of the Commission and approval of the discretion it had exercised. The essence of his verdict is found in the concluding paragraph of the decision.

"The Commissioners employing wisdom, judgment, foresight and industry of high character in the discharge of their duties in their office in connection with the railroad and the elimination of grade-crossings cooperated, as they should, with the able and efficient management of the railroad in saving that institution, the most important to the welfare of this State. They found the financial condition in the period covered by the complaint did not warrant orders for the removal of crossings other than those removed. There is no neglect on the part of any Commissioner, material or otherwise; upon the other hand they have discharged a public duty with a high degree of efficiency. If I were to make any criticism of these officials, based upon the mass of evidence presented in the case, it would be, that in their high conception of their public duties and zeal to serve and protect the public, they have, during these recent and extremely trying years for the railroad company, required of it the elimination of more crossings than under the circumstances was fairly reasonable."⁹⁸

The last grade crossing legislation to be enacted was the laws of 1931 which are involved in the legal proceedings against the Commission, recently decided in the Superior Court and referred to at the beginning of this article.

⁹⁴ *Ibid.*, p. 641.

⁹⁵ *Ibid.*, p. 643.

⁹⁶ *Alling v. Levitt*, 112 Conn. 592 (1930).

⁹⁷ *Middletown Press*, June 29, 1931.

⁹⁸ *Burrows v. Higgins et al*, P. U. R. 1931 D 473.

⁹⁸ *Hartford Courant*, July 14, 1931, pp. 1, 20.

It strikes one as rather remarkable that so little litigation in the courts has grown out of the laws governing grade crossings. This is all the more notable in view of the large amount of financial outlay entailed. Until a few years ago the only significant case brought in connection with the elimination of grade crossings was the Bristol case, in which the Commission took the initiative under authority conferred by the 1889 statute. It will be recalled that both the State Court and the United States Supreme Court gave their sanction to this law and the action of the Commission. The new law of 1915, as noted above, gave to the Highway Commissioner the right to petition the Utilities Commission for the removal of dangerous conditions at railway crossings and authorized the Commission, if the petition were granted, to apportion the cost between the municipality, the State, and the railroad. The Town of Old Saybrook appealed to the Superior Court against such an order of the Commission in which it had been assessed \$10,000 as its share of the cost incident to the removal of several crossings. The case was reserved for advice of the State Supreme Court. In 1924 the decision was rendered in support of the action of the Commission in the allocation of the charge.⁹⁹ The Court said,

"One cannot reasonably read the law in question without seeing in its provisions a legislative intent to give to the Commission broad powers to deal with dangerous conditions existing at the crossing of trunk-line highways and railroad tracks."¹⁰⁰

This decision is further evidence that the courts in Connecticut have not acted in such manner as to retard the work of grade crossing elimination.

From a different angle some light is thrown on the success of the Commission

in removing dangerous conditions at grade crossings. Table I shows the number of crossings eliminated in Connecticut since the appointment of the Public Utilities Commission and the number of accidents annually at grade crossings for every 10,000 automobiles registered during each of the years.

TABLE I. GRADE CROSSING ELIMINATIONS AND ACCIDENTS, 1912-30.*

Year	Crossings Eliminated	Accidents per 10,000 Automobiles
1912.....	1	11.672
1913.....	20	10.674
1914.....	4	8.852
1915.....	2	7.957
1916.....	3	7.922
1917.....	6	4.199
1918.....	5	3.564
1919.....	1	2.554
1920.....	0	3.545
1921.....	0	2.969
1922.....	1	2.181
1923.....	11	2.745
1924.....	6	2.447
1925.....	6	2.014
1926.....	5	1.573
1927.....	3	1.630
1928.....	9	1.626
1929.....	5	1.002
1930.....	.....	.830

*Data in the files of the Chief Engineer of the Commission.

These figures, when compared with other records of crossings elimination, show some discrepancies. The differences are explained by recalling that the table shows actual attainment in elimination whereas the Commission, in its annual reports, frequently combines those eliminated and those for which orders have been given.

In connection with this table, it should be recalled that the New Haven Railroad, the main one affected by the grade crossing law, paid no dividends from 1914 to 1927. From 1918 to 1920 it was under Federal control as a war measure.

⁹⁹*Old Saybrook v. Public Utilities Commission*, 100 Conn. 322 (1924).

¹⁰⁰*Ibid.*, at 328.

Furthermore, the financial condition of the roads was indicated in the law as a pertinent factor to be taken into consideration by the Commission in requiring the elimination of grade crossings.

Perhaps the more eloquent indication of an approach to the removal of hazards at grade crossings is found in the column which shows the number of accidents per 10,000 automobiles registered in the State. This column reveals a remarkable decrease in successive years in the number of accidents when correlated with automobile registrations, indicating that the modern problem is not so much one of public safety, the underlying purpose behind the 1889 law, as it is one of furthering public convenience by preventing the delay to highway traffic where gates or flagmen are used. In fact, most pressure to remove grade crossings in recent years has been brought in the interest of expediting highway traffic rather than the saving of human life.

This is still an important economic problem, but it is quite different from the one of human safety, the promotion of which dictated the passage of the law to bring about the removal of one grade crossing for every 50 miles of road in the State.

If it seems that the repeal of the old law by the General Assembly in 1931 is a step in the wrong direction, it must be recalled that local governments and the railways, as well as the Utilities Commission, still retain the power to initiate proceedings for the removal of grade crossings and dangerous conditions at all crossings. Also, the law of 1883 prohibiting the construction of any new grade crossings is still on the statute books. The action of the Highway Commissioner offers greatest hope for continued progress in the removal of grade crossings in the future in such number as to continue the record begun in 1849 and followed to date, a record which seems to place Connecticut in the lead in this type of welfare legislation.

Appliance Merchandising by Public Utilities

By WARREN WRIGHT

INTEREST in the methods used by public service companies in retailing electrical and gas appliances, and occasionally unrelated products, has been sharply aroused by certain legislative activities precipitated chiefly by independent merchants' organizations. Many aspects of this complicated problem are raised by the rather bitter competition often existing between public utility companies and regular dealers in selling appliances. The intensity of this rivalry has often led to the creation in the minds of the general public of fairly definite prejudices and unwarranted opinions with respect to the whole matter. The utility companies are variously accused of killing off the independent merchant, and the latter is portrayed as helpless against the onslaughts of the expanding public service concerns. Claims and counterclaims are made as to whether utilities or regular merchants give the better prices, the better services, and use the fairer selling methods. Utility concerns are put on the defensive at once by virtue of their size and relatively enviable position in the market. But in this paper the problem will be considered wholly from the standpoint of the economics of each particular situation presented; lack of adequate data on many points precludes many authoritative statements or final conclusions.

Extent of Public Utility Appliance Retailing

At the present time only three important electric service companies are not retailers of appliances. Surveys show,

¹ Data found in *Central Station Retail Shops* for July, 1930.

according to statements found in a retailing publication,¹ that in 1929 sales of electrical appliances were divided thus: power companies, 35%; contractor dealers, 20%; department stores, 9%; hardware stores, 16%; electrical dealers, 13%; furniture stores, 2%; and miscellaneous, drug stores, etc., 7%. The same report indicated that the utilities sold \$719,000,000 worth of electrical appliances in 1929. The number of retail outlets for appliances in the entire country is estimated at 200,000 as against 4,000 central station utility outlets. In 1930 sales of household electrical appliances by utility companies amounted to 30% of the entire disposals, according to Mr. J. F. Owen,² reporting to the Electrical Merchandising Joint Committee of the National Electric Light Association, the National Retail Hardware Association, Dry Goods Association, etc. A large portion, about 10%, of the above sales, however, were in the form of refrigerators, heaters, ranges, and other costly items. Even though wide errors probably are present in such estimates, total sales by utilities are obviously considerable.

It is not difficult to understand why the above percentages change as different markets are studied. Sales by utilities may run as high as 40% of all sales in rural regions and as low as 15% of total appliance sales in metropolitan areas. One reason for this tendency is the varying competitive situation in different areas. The utility companies, according to statements of their own

² J. F. Owen, "Views on the Electric Utility Companies' Relation to Merchandising and Promotion of Electric Appliances," printed by the National Electric Light Association, February 4, 1931.

representatives,³ are eager to sell at retail only when local independent dealers are not aggressively pushing the sale of quality appliances. Urban retailers are much more likely to do a good job in selling appliances than rural merchants, at least to the greater satisfaction of the utility companies.

The figures on sales of appliances will probably be higher this year than for any preceding year, despite current sluggishness in most businesses. This opinion is based on the present performances of the sales of many utility companies, and of some independent dealers. The reasons for such sales behavior would be interesting to examine, but this cannot be attempted here.

Comparative Prices

Several surveys have been made of appliance prices in the Chicago market.⁴ While no accurate conclusions can be based on such limited experience, a short analysis of what was found may at least support some general statements as to what might well be expected in similar markets with respect to prices. More important than any statistical statement of actual quotations at one time is a theoretical exploration of what price situations might and should exist, with some discussion of the reasons therefor. Ascertainment of whether or not prices actually coincide with what should be expected can be left to those expert in market survey work.

In all cases observed by the writer, prices on nationally known products were substantially the same in all stores.

³This seems to be the opinion of N. M. Clark, "When a Utility Company Merchandises," *Public Utilities Fortnightly*, February 5, 1931, p. 140 ff. Also, several Chicago utility sales officials have at various times given expression to such sentiments. See also a paper which won a prize at the 1927 N. E. L. A. convention, written by Paul Henshaw and published by the Memphis Power and Light Company under the title, "Selling Electrical Appliances." Another interesting paper,

Special sales on nationally advertised goods were run at times, but these sales apparently were run by all dealers simultaneously. Where utility stores offered products bearing a private brand, which was often recognized as that of companies operated by the utility organization, price comparisons became futile because of unknown factors, such as quality, costs, services given with sales, etc. In sporadic instances the public service shops sold appliances at prices below the lowest figures quoted by independent dealers but, contrariwise, instances were noted where prices asked by independent shops were lower than those asked at utility stores for apparently comparable products.

In the written reports of various trade organizations, appliance dealers, and news services, public service companies are frequently accused of cutting prices on standard appliance merchandise, but the writer's experience does not bear out this allegation. In any price comparison, however, account must be taken of other factors entering into the retail transaction, such as terms of payment, installation services, trade-in allowances on old appliances, and the like. Premiums offered to light customers are another means by which some utilities are said to offer appliances at a discount. Scientific price studies, however, usually make little attempt to evaluate such variable price factors, but they also do not conclude that one store or system has a net price advantage over another. Price comparisons are thus limited to

"Some Important Factors in Electrical Merchandising," is by A. K. Taylor, 13 N. E. L. A. Bulletin 82 (February, 1926).

⁴One survey was conducted by the writer's marketing students in Northwestern University at Evanston, Illinois, in May, 1931. Another was undertaken by the writer in August, 1931, in preparing this paper, in the University section of South Chicago. Full findings are available, but not in printed form.

measurable items and the results of such comparisons are at best only tentative.

An added qualification must be made. Even though surveys show that public service companies undersell all other merchants in monetary terms on certain brands of appliances, it must be apparent, of course, that whether this is an advantage to particular consumers or not depends on whether the latter are in the market for the appliances concerned. This in turn means that an independent dealer may offer better prices on some items than a utility because of the particular needs of definite consumers at any one time. But it is probably fair to conclude that the ultimate effect of low pricing by a utility on standard commodities is to divert considerable patronage from other establishments. This goes on the principle that people can be attracted by loss-leaders and will buy other goods while in a store featuring certain items at low quotations. Of course, merchandising includes more than price per commodity. Every sales opportunity must be broken down into its elements. But the utility company is often in a better position to offer inducements other than price, such as service variations, than are its competitors. More complete discussion of this last point will come later in this paper.

Furthermore, some rather theoretical analysis of prices in general, especially from the standpoint of marketing tactics, is called for at this point. If it can be concluded, at least for purposes of illustration, that prices asked by utility shops often compare unfavorably with those charged for comparable commodities by independent dealers, what standards can we use to decide as to the fairness of any price? If we assume, as many do, for example, the Federal Trade Commission, that selling below cost is unfair, what is cost? Cost in one sense is

related to the net situation of a business, so that some merchandise can be practically given away to economic advantage. This practice has been resorted to in a few known instances by public utilities, in order to hasten the development of a general market for utility services.

Again, does cost mean the price paid to jobbers or manufacturers by retailers? But suppose that different prices are paid by different dealers for the same products? Or, more likely, probably prices to jobbers are the same in all cases, but can we say that all dealers must use the same mark-up to get identical selling prices, in spite of great divergencies in operating and selling costs? Moreover, when a public service company retails appliances produced in the plant of a subsidiary, a joint-cost problem at once confronts those who would decide what selling prices are fairly related to cost of operation. Selling prices of appliances may be such that great injury is worked upon competitors of utilities, while the latter are only pursuing the customary expedient of taking advantage of production and distribution economies to market goods at attractive prices.

Then, again, if we seek to establish "fair prices" for appliances, by some method yet unknown, we are forced to recognize that, if prices are based upon the cost situation in the case of marginal concerns, superior companies are enabled to reap a large profit. This result may or may not be deemed socially expedient. In many actual cases, it is true, prices were considered by most merchants to be fair when they were what all dealers agreed upon or were what manufacturers advertised. This is only *one* method of solving the problem.

In conclusion, fair price practices on the part of public service companies are often said to exist when prices for

appliances are such as permit regular dealers to merchandise appliances at a profit. Prices tend to be at "customary or convenient" levels, whereas costs of doing business are infrequently price-determining from day to day. Many cases have been cited⁵ where utilities were able to increase their sales of appliances by lowering prices, having regard only to consumers' buying habits and sales resistance, irrespective of dealers' profits. At times such procedure has saved the financial life of tottering utility organizations whose "load factors" were in dire need of rejuvenation. Even in such situations independent dealers have been at times somewhat protected by co-operative methods which allowed them reasonable profit percentages on all sales of appliances by utilities. Eventually, selling is usually restored to a normally profitable basis for all merchants, once the utility is saved from prolongation of distress originally caused by the slowness with which customers installed outlets. Bargain sales of this kind serve to open up many a market, and dealers are likely to find that the rebound from such activity takes the form of steadily increasing demand for appliances. Sales of all shops are thus enhanced.

Selling Tactics Used by Public Service Companies

One who studies the various means by which service customers of public utility companies can be tactfully approached for appliance sales quickly learns that some methods now being used by many conservative independent dealers are decrepit and rather futile. The utilities seek their customers in the utility store, in the street car, in the home, through the mail in connection with monthly

service bills, and via effective bill and newspaper advertisements. These methods get results. The costs of such selling are borne by rate-payers and appliance consumers except where the law compels separation of service and appliance marketing. Because separation of accounting for the two activities is still uncommon, little is known as to the proportionate cost burdens borne by different customers of utilities.

Appliances are frequently sold on installment contracts, with relatively small initial payments, and the balance written on the periodic service bills. Time for payment sometimes is longer than the period permitted by independent dealers, partly because of the comparatively greater financial strength of utility concerns and partly because they sell in a protected market.

Compensation of utility salesmen is almost always a blending of salary and commission, the latter based on power units instead of unit sales of merchandise. It was apparent that in many cases the selling costs to the public utilities were high because of some overstocking in salesmen, since the object in view was to increase domestic utilization of electric energy and gas. The fact of overstocking in salesmen was commented on by utility officials in many instances.⁶ Some utilities pursue the rather practical and intelligent policy of enlisting all their employees in selling appliances, the rewards for sales coming in the form of bonuses of various kinds and an opportunity to become a regular member of the sales staff after a probationary period. "Linemen" are discovered to possess latent sales talent, for

⁵ For example, see Clark, *op. cit.*, continued in February 19, 1931, p. 213 ff. See also an article by F. X. Welch, "When a Utility Merchandises," *7 Ibid.* 67 (January 22, 1931).

⁶ These observations are reported from conversations with sales officials of several companies in the Chicago region. Also, it is a matter of common observation that the Edison store in Chicago's Loop is generously overmanned with sales people. The Edison Company also uses hundreds of men to canvass city homes.

one example, and meter readers are found to sell faster than regular salesmen of independent dealers. This is not a surprising result to one familiar with the unimaginative selling practices of many "orthodox" merchants.

Advantages to the Public Utilities of Selling Appliances

The public utilities are said to have been the first to sell electrical and gas appliances. Other dealers came into the household utilities market later, when pioneering had made investment safe to those who followed. It is significant, then, to review some of the points mentioned by utility officials falling under the above heading. First, tests run in normal times have shown that when utilities cease to merchandise at retail, total sales of appliances fall off appreciably, and pick up when utilities again sell. Second, if consumers of power and gas can be induced to come into utility offices and salesrooms to pay their bills and redeem coupons obtained with bills rendered for service, the public service companies thereby obtain an opportunity to create good will by splendid displays of appliances; to facilitate the registering of complaints by rate-payers; to demonstrate the operation of the newest creations in appliances; and, also, indirectly to force other dealers to spruce up their own shops—all of which, it is hoped, will increase the number of appliances used in homes. Furthermore,

⁷See P. S. Millar, "Excellence Induces Use," 93 *Electrical World* 973 (May 18, 1929).

⁸It is commonly known that retailers present a chequered history of ups and downs in the fortunes of individual merchants. Shops are empty one day and filled by new retail tenants another day, then empty again, and so on. Public service companies are in business in perpetuity, for all practical purposes, and because of this fact allowances must be made when considering the efforts of utilities to promote greater and greater utilization of appliances. History does show that quality appliances have been forthcoming only after consumers evinced their disgust by refusing to buy new appliances to replace others "gone bad." And the

the utilities are said to sell only the best quality products,⁷ and they attempt to price them low enough to induce the housewife to consider hitherto fancy appliances as everyday home necessities. Pressure is brought ruthlessly to bear on appliance manufacturers to perfect products at lower prices. Utilities can threaten to make their own appliances and make good on the threats in many cases.

Lamps of "right" sizes, mostly large, are often renewed at no charge, save a small allowance in electric rates included in a manner contemplated to arouse no resentment by the rate-payer. Finally, the utilities often stress the sale of those kinds of appliances which will increase the steady pull on power lines and gas mains as opposed to products the use of which would create more peaks in an already jagged load curve.

Apparently public utilities have actually contributed to the technical development of appliances in general, in the ways suggested above. Of course, some changes would have come had independent dealers been the sole dispensers of appliances, but the fact remains that the utilities have a keener interest in quality and long-time consumer good will in the use of appliances than dealers whose object is chiefly to sell products for a profit that depends largely on single transactions. The time factor appears to assume different significance to each group.⁸ Furthermore, utility employees often carry excellent "testing" equipment

utility companies continue to be the watch-dogs of quality lest past mistakes be made again with the result that the public refuse to use electricity for more purposes. It is important to note that the possibilities in selling appliances have hardly been touched, so wide and deep the market can be seen to be. This conclusion is borne out by several appliance surveys conducted by the writer. See also a paper by J. F. Gilchrist, "Commercial Development Between Now and 1930," 13 *N. E. L. A. Bulletin* 97 (February, 1926). See also a paper by M. J. Insull, "Load Building Opportunities," 87 *N. E. L. A. Proceedings* 1930, p. 94.

to insure performance of appliances, when installed in homes. Also, inspection is commonly well done in utility shops.

Cooperation Between Dealers and Utilities

In numerous places utility companies have used various means of demonstrating to independent dealers that they are chiefly concerned with selling utility service. Utilities sometimes buy the commercial paper of dealers originating in sales of appliances to consumers; they often sell appliances to dealers at regular, or better, discounts; they engage in cooperative advertising campaigns, and use their own missionary salesmen to help dealers close sales; and so on to include new cooperative plans being put into operation almost daily.⁹

An outstanding cooperative plan is that inaugurated over a year ago by the San Joaquin Light and Power Company of California. The San Joaquin Company puts 13 salesmen and 2 service men at the disposal of regular dealers selling appliances; the utility sells specialty products to these dealers at prices better than those offered by some jobbers, for monthly "bargain" sales; dealers are assisted in store design and inventory control; prices are never cut on nationally advertised products; jobbers are pleased by purchases through them of greater total volumes of products, mostly specialties, than in times past when selling was wholly competitive;

cooperative advertising tie-ups are used; and efficient customer lists are maintained and used jointly. The net results have been dealer good will, increased sales of power, and improvement in the quality of appliances and excellence of service. Sales rise even in an otherwise slack market as the "cooperators" push ahead.

Other plans of equal merit, though different in details, are described in publications of the Joint Committee on Merchandising of the National Electric Light Association, National Retail Hardware Association, National Retail Dry Goods Association, etc., and are also to be found in current marketing and public utility periodicals. The Westinghouse Company emphasizes the value of cooperative sales displays and campaigns to utilities and independent dealers, and is active in informing questioners about its methods. The importance of many of these plans lies in the recognition of the "vested interests" of independent merchants by their chief competitor.

Public Interest and the Future

In general, utility and non-utility operations of public service companies should be, and are, kept apart.¹⁰ This prevents any attempt to assess rate-payers for losses suffered in selling appliances, and goes along with the stated willingness of many dealer organizations to compete with public service

⁹ The National Electric Light Association will supply descriptions of many such plans. Their most valuable document is called, "Current Information on Power Company-Dealer Cooperative Merchandising." Many cooperative plans are described.

¹⁰ A statute in Wisconsin, recently enacted, directs the Public Service Commission to supervise and order plans for separating appliance selling and merchandising of service. In other words, losses on appliances may not be made up in rates, nor, for that matter, will gains made on appliances necessarily result in lower service rates unless the utility elects to decrease rates as a marketing expedient.

Many difficulties are inherent in such attempts to separate the two activities described. When appliances are given away or sold for low prices in order to build the load factor, such losses may be considered promotional costs. It would seem to this writer that merchandising losses might fairly be treated as promotional expenses to come out of rates at some time when expedient.

For a discussion of the Wisconsin law and the commission ruling see "This Matter of Merchandise Accounting," 17 N. E. L. A. Bulletin 608 (October, 1930). The decision is in re U-3892 of the Railroad Commission of Wisconsin.

stores on a strictly appliance basis. Retailers may be able to sell appliances more efficiently than do the utilities as the former become more alive to the needs of the situation. As a matter of fact, a great deal may be said in favor of the permanent continuance of public service companies in the business of selling appliances on the ground that these companies supply the needed leadership in developing methods of canvassing the market while maintaining high standards of excellence in quality of appliances.¹¹

In many cases the utility companies have turned over their installation work to independent contractors. In places this has not been possible because of lack of competent workmen to be hired. In general, this practice is recommended, for it allows legitimate technicians to ply their trade and makes accounting for rates easier by reducing the functions performed by these regulated industries. When contractors turn over the names of prospects to utility salesmen, they should receive adequate sales commission. The men who install appliances have excellent opportunities in many instances to sell additional appliances to the housewife. At present, utility repair men often take full advantage of their opportunities to interest the householder in new appliances.

Trade-in allowances can be standardized to prevent indiscriminate price-cutting. Utilities that handle their own brands of appliances cannot continue to sell these products below customary prices. If down payments and sales terms offered by utilities are more generous than those of independent dealers, the

charge of unfairness is best avoided by means of some plan whereby public utilities help dealers grant similar terms. This is sometimes done through purchase of dealers' commercial paper at reasonable rates. Such procedure is particularly applicable in sales of the most expensive appliances and in markets where dealers are financially weak.

Clear recognition should be made of the peculiar position in which competitors of public utilities find themselves. Utilities sell services in a protected or guaranteed market; regular dealers must scramble for appliance sales. Hence, it is impossible for the latter to fight price-cutting by the utilities by use of similar methods applied to other products. Utilities cannot be attacked in their main market save by legislation. This is an important reason for the embittered opposition of merchants to the unrestrained merchandising of appliances by public service companies.

Public utility companies which sell products other than appliances are provoking reprisals by independent dealers and possibly may lose consumer good will. If sales of non-appliance merchandise are large, it would appear that consumers are pleased. But we must wait until more is known about the effect of such merchandising upon service rates and until more pertinent information seeps through to the public which supports the utility companies via rates for services. In theory, as the sale of appliances increases and load factors are improved, service rates will decline. If the latter result is too slow in coming, through regulative lag or impotence of commissioners, or comes only to

¹¹ The advantages possessed by independent dealers in competing with public service stores can be summarized: (1) personal interest of the owner, and good will thereto attached; (2) credit allowances on as attractive bases as anywhere procurable, assuming that dealers are alive to the possibilities of borrowing; (3) efficiency of employees who are sales specialists under direct con-

trol of owner; (4) popular sympathy for the small business man; (5) convenience in location; (6) reliability, and so on. Buying power can be increased by means of cooperative associations, use of warehouses to stock shipments, and, in many cases, by purchasing at fair rates from the public service companies themselves.

industrial users, service consumers may at last realize that the big merchandise shows put on by certain utility stores are being paid for by rate-payers with no certain benefit to themselves. And many of these same rate-payers are themselves engaged in merchandising appliances and thus suffer twice.

The impression widely current that installment payments on appliances must be paid promptly or service consumers will suffer cessation of utility service has no basis in fact or law, and should be dissipated by the public companies themselves as another important gesture of friendship toward all other appliance dealers. If the independent dealers are willing to have the utilities bill appliance sales on service accounts, there is no harm in the practice. In many cases, one may suppose, the dealers will co-operate with utilities to the extent of turning over sales of heavier appliances to the utility stores, and will then be interested in any method which tends to lessen the credit risk of the utilities, and indirectly, of themselves.

Salesmen of utilities must be strictly controlled in the interests of fair play all around, and such control is made possible through salary-bonus methods. Compensation really belongs on a kilowatt and gas-unit basis, else appliances may be sold by unfair tactics, by low-pricing, fake approaches, and by means of special deals of all kinds. Certain utility sales organizations are locally well-known for their aggressive methods.¹²

The particular form which cooperation between dealers and utilities will

take can hardly be forecast. Present plans in successful operation point the way.¹³ Legislation seeking to bar public service companies from appliance merchandising is harmful in that it removes the positive influence formerly supplied by such companies for improvement in kinds, quality, and costs of appliances. The threat of more legislative action is reason enough for all parties to unite to bring some order into the present chaos of many bitterly competitive markets.

A major objective in any solution of the problem outlined above is to expedite installation of appliances in the homes of American consumers, for many of these electrical appliances have taken on the nature of convenience staples. But in this process fundamental questions at once arise: (1) Shall the selling aggressiveness of utilities be kept? But how, and yet protect independents whose market position is not based on monopoly? (2) If cooperation is effected, what guarantees are given to consumers that prices will be fair? What controls will replace the quondam rivalry of the market place? (3) If the present condition is continued, what can be done to protect the rate-payers who are likely to be compelled to underwrite merchandising enterprises? (4) Who shall devise and enforce "working rules" looking to the stabilization of the appliance market? Will stabilization mean stagnation? (5) Should utilities be barred from selling products unrelated to service, and if so, how? Answers to these and other questions are the solution we seek.

into the homes where wary housewives would be slow to open their doors. The salesmen say that they are not directed in these tactics by their superiors, but the responsibility for these methods lies with the company inasmuch as the latter puts so high a premium on results, that is on sales.

¹² An excellent cooperative plan is described by E. A. Willard, "Trade Dealer Sales Plan in Portland, Maine," 66 *Gas-Age Record* 180 (August 2, 1930). See also, F. W. Parsons, "Sales Allies," 66 *Gas-Age Record* 407-9 (September 13, 1930). See also page 391 *supra*.

¹² Several Chicago companies place their salesmen entirely on a commission basis. The competition between salesmen and the payment method sometimes results in high-pressure selling. Instances are known to the writer. For example, many utility salesmen in metropolitan Chicago have learned how to bully housewives into buying new appliances. They threaten inspection by fire officials or building supervisors. They often pose as utility service men in order to facilitate entrance

A Comparison of Public and Private Electric Utilities in Massachusetts

By CHARLES H. PORTER

Introduction

PUBLIC versus private ownership of public utilities is one of those hardy perennials of discussion which are never out of season. At their *best* the private companies are quicker to develop improved methods, the resulting gains being divided between the stockholders and the consumers. At their *best* the municipal plants are less aggressive in demonstrating to their customers the advantages of an increased use of electricity, but pass along to them all gain resulting from the adoption of improved methods. At their *worst* the difference between the two is the difference between graft at the top and graft at the bottom.

In Massachusetts, as elsewhere, most of the private electric companies and most of the municipal plants fall short of perfection. The purpose of this article is to compare the municipal plants with similar private plants, primarily from the standpoint of the domestic consumer. Are the private companies more efficient than the municipal plants? If so, how much more efficient? Is the customer of the private company paying one dollar for private initiative and receiving in exchange only 50 cents worth of increased efficiency and service, or is the situation just the reverse of this? Are the customers of the average municipal plant paying more or less for their electricity than their neighbors in the next town who buy from a private company? If less, to what extent are the lower rates made possible by open or hidden subsidies to the municipal plants, such as exemption from taxation or even direct appropriations from the

tax levy to cover deficits in operating expenses? To what extent is the factor of interest an inherent advantage of the municipal plant? These are some of the questions which, so far as possible, should be answered.

In 1918 Dr. Edmond Earle Lincoln published an exhaustive comparative study of the municipal plants of Massachusetts and a selected list of private companies of similar size based on the figures of 1915 and earlier.¹ Since that date the situation has changed materially in many respects. Many plants which were then compared as generating units are now purchasing all the electricity they sell. The concentration of control of private companies by larger units has given to even the smallest companies, with only a very few exceptions, the benefits of highly expert technical advice and large-scale financing. Today a much larger proportion of the physical plants have been installed since engineering practice became comparatively standardized. Consequently, earlier errors in judgment, unavoidably rapid obsolescence attributable to advances in the art, in some cases perhaps excessive prices paid by municipalities acquiring previous private plants, are all now of much less effect on the total fixed charges than they were 15 years ago. A smaller proportion of the total kilowatt hours of the municipal plants is used for street lighting. The constant pressure from the Department of Public Utilities and new forms of annual reports

¹ *The Results of Municipal Electric Lighting in Massachusetts* (Boston: Houghton Mifflin Company, 1918).

instituted in 1921 have resulted in better and more uniform accounting and more reliable statistical data. A new survey of the results of municipal ownership in Massachusetts is therefore desirable, even though it is less complete than that of Dr. Lincoln.

The Massachusetts Legislature of 1929 authorized the appointment of a Special Commission on the Control and Conduct of Public Utilities. The report of the Commission² points out that with only a few exceptions all private gas and electric companies in Massachusetts are in the hands of eight great systems:

1. Edison Electric Illuminating Company of Boston; commonly called Boston Edison
2. New England Power Association
3. Tenney Properties
4. Associated Gas and Electric System
5. Eastern Gas and Fuel Associates (no electric properties)*
6. Massachusetts Utilities Associates†
7. Western Massachusetts Companies
8. Stone and Webster Properties

*Eastern Gas and Fuel Associates has since acquired the Charlestown Gas and Electric Company.

†The management of the properties of the Massachusetts Utilities Associates has since been taken over by the New England Power Association.

Table I, reproduced from the report of the Special Commission,³ shows clearly

the situation in 1928. Corresponding figures for 1929 would be essentially the same. While municipal electric plants in 1929 supplied only 118,290 customers as against 1,056,028 for the private companies, or approximately one in ten, they are nevertheless an important factor in the situation. Not only is a population of 400,000 people dependent on the municipal plants for electricity, but the rates of municipal plants react on those of important private plants in adjacent communities. For example, correspondence introduced as evidence in the Cambridge rate case before the Department of Public Utilities⁴ in 1928 showed that the management of the Cambridge Company was keenly sensitive to the lower rates offered by the municipal plant in the adjacent town of Belmont.

Of the 45 municipal plants referred to in Table I, two small ones, those of Dana and Oakham, were taken over by the New England Power Association in 1929. Four of the remaining 43 municipal plants supply both gas and electricity;

² House Document, No. 1200, 1930.

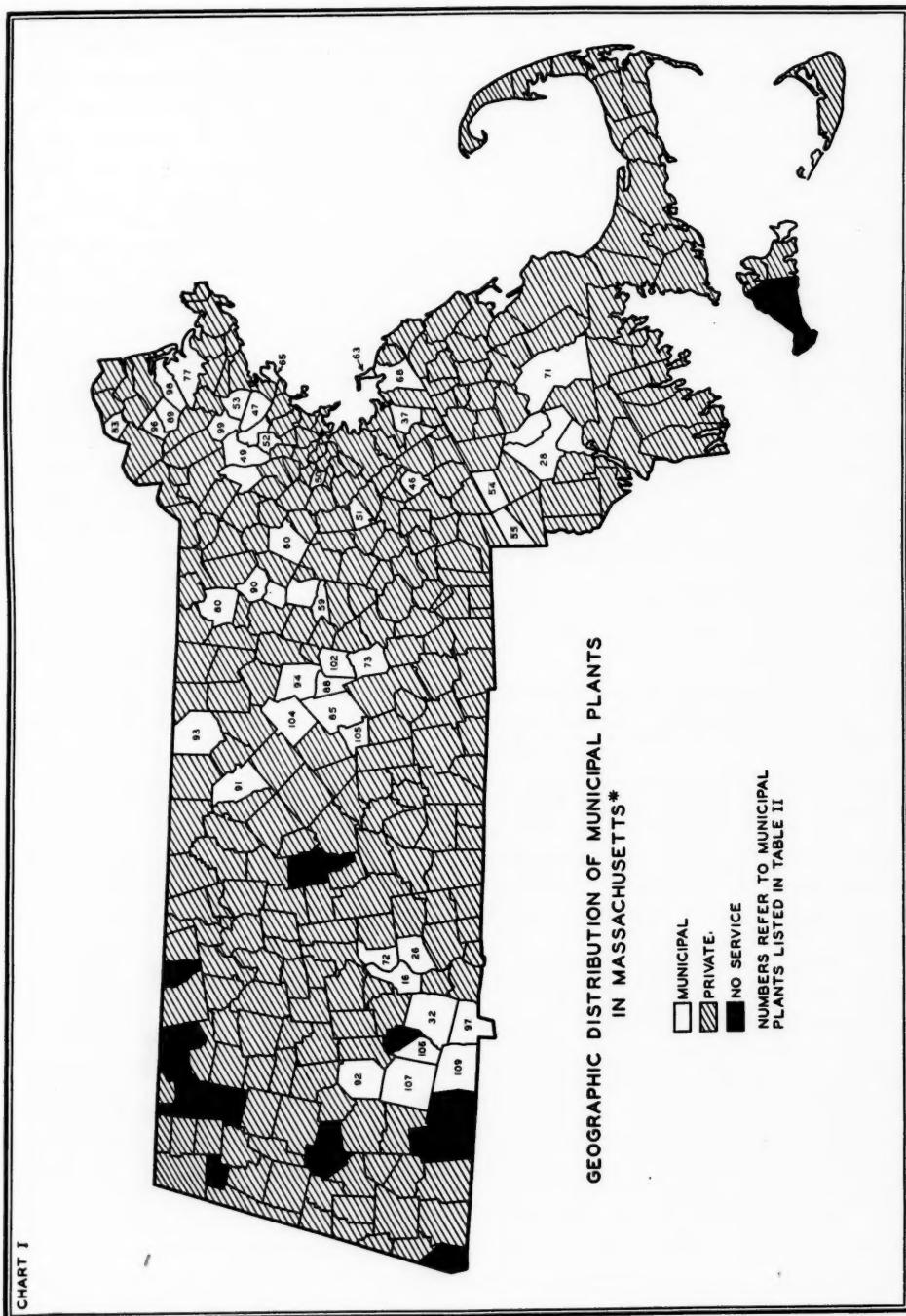
³ *Ibid.*, p. 25.

⁴ *In re Cambridge Electric Co.*, 1928 Mass. D. P. U. 2712, 2713, 3049 (P. U. R. 1928 C 25).

TABLE I. SUMMARY OF ELECTRIC UTILITY DATA FOR MASSACHUSETTS, 1928.*

Groups	Number of Operating Companies Controlled	Number of Cities and Towns Served	Population Served	Percentage of Total Kw. Hrs. Generated	Percentage of Total Kw. Hrs. Sold Retail	Percentage of Gas Sold Retail	Gross Revenue Electricity	Gross Revenue Gas	Capitalization of Operating Companies
Boston Edison.....	1	40	1,280,000	31.4	26.8	...	\$27,891,950.54	...	\$119,992,933.95
New England Power Association.....	12	45	764,650	25.6	25.1	3.2	19,718,180.50	\$1,157,063.21	63,034,217.91
Tenney Properties.....	12	54	1,033,481	7.0	7.3	17.8	9,812,060.49	7,226,683.62	39,258,729.88
Associated Gas & Electric System.....	9	50	788,000	9.3	9.5	15.7	6,325,972.16	5,525,641.43	26,703,625.45
Eastern Gas & Fuel Associates.....	2	18	1,126,000	...	...	37.3	...	11,832,118.46	41,716,864.80
Massachusetts Utilities Associates.....	42	92	630,000	.6	6.1	5.9	7,543,856.92	2,807,740.94	17,450,325.25
Western Massachusetts Companies.....	11	43	400,000	14.1	13.2	.2	9,469,046.51	112,414.23	23,991,749.40
Stone & Webster Properties.....	5	25	347,900	5.9	2.5	5.3	3,397,806.19	1,724,769.53	16,181,864.92
Independents.....	23	52	286,000	3.9	3.8	12.5	3,511,688.88	4,456,600.32	13,665,509.03
Total—Private Companies.....	117	...	...	97.8	94.3	97.9	\$87,670,562.19	\$34,843,031.74	\$361,995,820.59
Municipal Plants.....	45	52	391,715	2.2	5.7	2.1	5,269,488.89	730,099.53	...
Grand Total .....	...	...	100,0	100.0	100.0	\$92,940,051.08	\$35,573,131.27	\$361,995,820.59	

*Capitalization, revenues, and operating information have been compiled from the annual return of the operating companies for the year 1928 as published by the Department of Public Utilities. Capitalization includes par value of capital stock, premium paid on capital stock, bond and note issues.



* The municipal plant at Littleton (90) supplies the neighboring town of Boxborough; Hudson (59) supplies Stow; Reading (49) supplies Wilmington and Lynnfield; and Taunton (28) supplies Raynham and Berkley.

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the other plants supply electricity only.

The following tabulation shows by five-year periods the dates when the present municipal plants were started or acquired from existing private companies.

<i>Period</i>	<i>Started</i>	<i>Acquired</i>	<i>Total</i>
1889.....	1	0	1
1890-1894.....	3	3	6
1895-1899.....	2	6	8
1900-1904.....	4	1	5
1905-1909.....	4	3	7
1910-1914.....	9	2	11
1915-1919.....	0	0	0
1920-1924.....	2	0	2
1925-1929.....	3	0	3
	—	—	—
	28	15	43

As is generally the case, many of the municipal plants were started originally because at the time the prospective profits were too small to attract private capital. To this extent they had a less favorable territory at the outset.

Chart I shows the geographical distribution of the cities and towns having municipal plants.

Of the private companies having a separate corporate existence throughout 1929, 19 supplied both gas and electricity and 60 supplied electricity but not gas. Of the latter, six companies sold electricity only at wholesale to other companies and large manufacturers; one is essentially a submetering company and four are small plants operated by manufacturing corporations for their employees.

Since there are no municipal plants with which the wholesaling companies can be compared, and since the plants maintained by the manufacturing companies cannot be regarded as examples of

normal private operation, these 11 companies will be omitted from all further consideration.⁵

Kilowatt Hours Sold

Table II shows the total number of kilowatt hours sold by each of the 68 private companies selling electricity to the small consumer and by each of the 43 municipal plants. In order to bring out more clearly the relative size of the establishments, they are arranged in the table according to kilowatt hours sold rather than alphabetically. While it is not feasible to compare any one municipal plant with any specific private company, comparison in general should be between establishments of similar size. For this reason the same sequence according to size will be adopted as standard in all subsequent tables.

Because certain costs will later be computed per kw. hr. sold and because the total kw. hrs. sold is the best criterion of size, the figures in the table are taken directly from the reports filed with the Massachusetts Department of Public Utilities and have not been adjusted for interchange power or other duplications. In the case of the municipal plants, electricity used by the town both for street lighting and for other purposes is included as "sold."

Because many operating expenses are more nearly proportional to the number of customers than to the quantity of electricity sold, the data as to customers have been included in Table II as a basis for certain average costs listed in later tables.

The establishments generating some electricity and the establishments purchasing all electricity sold will be listed separately in subsequent tables, but it

⁵ The names of the omitted companies are as follows: New England Power Co., Turners Falls Power and Electric Co., Montauk Electric Co., Eastern Massachusetts Electric Co., Holyoke Water Power Co., Holyoke Power

TABLE II. TOTAL KILOWATT HOURS SOLD BY INDIVIDUAL ESTABLISHMENTS, 1929.
(NOT ADJUSTED FOR DUPLICATIONS)

Number	PRIVATE COMPANIES			MUNICIPAL PLANTS		
	City	Number of Customers	Kw. Hrs. Sold (⁰⁰⁰ Omitted)	Kw. Hrs. Sold (⁰⁰⁰ Omitted)	Number of Customers	City
1	Boston Edison.....	351,986	877,650	.....	.....	.....
2	New Bedford.....(Gas)	40,947	198,272	.....	.....	.....
3	United, Springfield.....	51,881	125,599	.....	.....	.....
4	Salem.....	11,853	120,161	.....	.....	.....
5	Worcester.....	55,393	117,427	.....	.....	.....
6	Fall River.....	32,750	108,321	.....	.....	.....
7	Cambridge.....	33,555	83,891	.....	.....	.....
8	Brockton.....	29,435	67,996	.....	.....	.....
9	Malden.....	50,631	57,597	.....	.....	.....
10	Lynn.....(Gas)	40,114	55,141	.....	.....	.....
11	Lowell.....	28,460	44,763	.....	.....	.....
12	Pittsfield.....	14,925	43,753	.....	.....	.....
13	Lawrence.....(Gas)	32,897	31,442	.....	.....	.....
14	Haverhill.....(Gas)	19,112	31,169	.....	.....	.....
15	Fitchburg.....(Gas)	12,535	26,159	.....	.....	.....
16	.....	.....	.....	26,051	16,229	Holyoke (Gas)
17	Worcester Suburban.....	11,281	25,490	.....	.....	.....
18	Central Mass., Palmer.....	9,202	20,610	.....	.....	.....
19	Greenfield.....	10,226	20,589	.....	.....	.....
20	Quincy.....	21,758	20,393	.....	.....	.....
21	Southeastern.....	5,700	20,134	.....	.....	.....
22	Abington and Rockland.....	8,370	18,759	.....	.....	.....
23	Union, Franklin.....	4,510	16,712	.....	.....	.....
24	Weymouth.....	6,568	15,507	.....	.....	.....
25	North Adams.....(Gas)	6,160	14,212	.....	.....	.....
26	.....	.....	.....	13,773	9,912	Chicopee
27	Charlestown.....(Gas)	6,240	12,984	.....	.....	.....
28	.....	.....	.....	12,685	10,771	Taunton
29	Webster and Southbridge..(Gas)	10,033	11,684	.....	.....	.....
30	Gardner.....	7,469	11,553	.....	.....	.....
31	Attleboro.....	6,393	11,161	.....	.....	.....
32	.....	.....	.....	11,007	5,696	Westfield (Gas)
33	Northampton.....	6,375	10,608	.....	.....	.....
34	Leominster.....	5,776	10,375	.....	.....	.....
35	Southern Berkshire.....	5,049	10,321	.....	.....	.....
36	Suburban, Revere.....(Gas)	15,069	9,351	.....	.....	.....
37	.....	.....	.....	8,574	4,842	Braintree
38	Gloucester.....	10,417	8,500	.....	.....	.....
39	Beverly.....(Gas)	8,849	8,363	.....	.....	.....
40	Cape and Vineyard.....	12,350	8,119	.....	.....	.....
41	Athol.....(Gas)	5,114	8,094	.....	.....	.....
42	Plymouth.....	8,225	7,471	.....	.....	.....
43	Marlboro.....	8,510	6,945	.....	.....	.....
44	Amesbury.....	4,653	6,915	.....	.....	.....
45	Milford.....	4,686	6,536	.....	.....	.....
46	.....	.....	.....	6,197	4,383	Norwood
47	.....	.....	.....	6,164	6,540	Peabody
48	Clinton.....(Gas)	4,335	5,264	.....	.....	.....
49	.....	.....	.....	5,240	5,221	Reading
50	.....	.....	.....	4,258	6,644	Belmont
51	.....	.....	.....	4,152	3,413	Wellesley
52	.....	.....	.....	4,116	4,462	Wakefield (Gas)
53	.....	.....	.....	3,951	3,021	Danvers
54	3,702	2,077	Mansfield
55	3,078	2,960	North Attleboro
56	Middlesex.....	1,429	2,978

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TABLE II. (*Continued*) TOTAL KILOWATT HOURS SOLD BY INDIVIDUAL ESTABLISHMENTS, 1929. (NOT ADJUSTED FOR DUPLICATIONS)

Number	PRIVATE COMPANIES			MUNICIPAL PLANTS		
	City	Number of Customers	Kw. Hrs. Sold (ooo Omitted)	Kw. Hrs. Sold (ooo Omitted)	Number of Customers	City
57	Spencer.....(Gas).	1,774	2,968	.....	.....	.....
58	Adams.....(Gas).	3,448	2,935	.....	.....	.....
59	.....	.....	.....	2,932	2,922	Hudson
60	.....	.....	.....	2,682	1,669	Concord
61	Easthampton.....(Gas).	2,854	2,470	.....	.....	.....
62	Amherst.....(Gas).	3,352	2,320	.....	.....	.....
63	.....	.....	.....	2,242	3,429	Hull
64	Winchendon.....	1,455	2,214	.....	.....	.....
65	.....	.....	.....	2,185	3,920	Marblehead
66	Ware.....	2,236	2,060	.....	.....	.....
67	Seekonk.....	1,552	1,909	.....	.....	.....
68	.....	.....	.....	1,868	2,610	Hingham
69	Ayer.....	987	1,855	.....	.....	.....
70	Lee.....	1,100	1,832	.....	.....	.....
71	.....	.....	.....	1,666	2,624	Middleboro (Gas)
72	.....	.....	.....	1,640	1,813	South Hadley
73	.....	.....	.....	1,548	2,339	Shrewsbury
74	Randolph and Holbrook.....	2,983	1,351	.....	.....	.....
75	Williamstown.....(Gas).	1,539	1,168	.....	.....	.....
76	Norton.....	593	1,099	.....	.....	.....
77	.....	.....	.....	1,079	1,683	Ipswich
78	Manchester.....	1,151	795	.....	.....	.....
79	Ludlow.....	1,641	769	.....	.....	.....
80	.....	.....	.....	743	649	Groton
81	Agawam.....	1,662	727	.....	.....	.....
82	Citizens, Nantucket.....(Gas).	1,947	687	.....	.....	.....
83	.....	.....	.....	651	804	Merrimac
84	Blackstone.....(Gas).	1,574	578	.....	.....	.....
85	.....	.....	.....	536	1,074	Holden
86	Mill River.....	475	527	.....	.....	.....
87	Provincetown (Estimated).....	1,300	476	.....	.....	.....
88	.....	.....	.....	445	524	West Boylston
89	.....	.....	.....	437	674	Georgetown
90	.....	.....	.....	390	489	Littleton
91	.....	.....	.....	371	897	Templeton
92	.....	.....	.....	330	241	Chester
93	.....	.....	.....	293	536	Ashburnham
94	.....	.....	.....	251	479	Sterling
95	Charlemont.....	218	241	.....	.....	.....
96	.....	.....	.....	234	606	Groveland
97	.....	.....	.....	224	367	Southwick
98	.....	.....	.....	212	395	Rowley
99	.....	.....	.....	165	288	Middleton
100	Harvard.....	326	159	.....	.....	.....
101	Hampshire.....	175	144	.....	.....	.....
102	.....	.....	.....	134	307	Boylston
103	Huntington.....	290	109	.....	.....	.....
104	.....	.....	.....	98	260	Princeton
105	.....	.....	.....	92	188	Paxton
106	.....	.....	.....	52	143	Russell
107	.....	.....	.....	33	84	Blandford
108	Leverett.....	66	28	.....	.....	.....
109	.....	.....	.....	23	105	Granville
110	New Salem.....	78	20	.....	.....	.....
111	Western Mass., Hancock.....	25	9	.....	.....	.....
	Total.....	1,056,028	2,348,419	136,504	118,290	.....

TABLE III. KILOWATT HOURS SOLD BY PRIVATE COMPANIES AND BY MUNICIPAL PLANTS, 1929.

	PRIVATE COMPANIES			MUNICIPAL PLANTS		
	Number	Kw. Hrs. Sold (ooo's Omitted)	Number of Customers	Number	Kw. Hrs. Sold (ooo's Omitted)	Number of Customers
Generating Plants						
Electric.....	19	1,733,603	717,492	8	41,541	37,568
Gas and Electric.....	10	380,362	186,617	2	27,717	18,853
Total.....	29	2,113,965	904,109	10	69,258	56,421
Purchasing Plants						
Electric.....	30	189,555	120,643	31	52,123	51,711
Gas and Electric.....	9	44,899	31,276	2	15,123	10,158
Total.....	39	234,454	151,919	33	67,246	61,869
Grand Total.....	68	2,348,419	1,056,028	43	136,504	118,290

may be of interest at this point to summarize the total sales by the different groups (Table III).

It may also be desirable to summarize the total sales by groups based on the size of the establishments. In Table IV plants selling more than 8,000,000 kw. hrs. per year are classified as larger plants, and those selling less than 8,000,000 kw. hrs. as smaller plants. The reason for making this figure the dividing point is that it throws into the last group private companies and municipal plants with approximately equal total sales and about the same total number of customers.

Current Lost and Unaccounted For

A rough indication, but by no means an exact measure of efficiency, is the per-

centage of current "lost and unaccounted for." The current for street lighting is frequently estimated and any error in this estimate results in an equal and opposite error in the current lost and unaccounted for. Density of customers per mile of distribution system and the proportion of customers who are summer residents only are other factors to be considered before evaluating the record of any particular establishment. Whether a plant generates or purchases and, if it purchases, whether the transmission or transformer losses are absorbed by the generating or purchasing plant will also affect the percentage of current lost or unaccounted for. Table V gives the percentages for whatever significance they may have, but it should be emphasized

TABLE IV. KILOWATT HOURS SOLD BY PRIVATE COMPANIES AND MUNICIPAL PLANTS, CLASSIFIED BY SIZE OF PLANTS, 1929.

	PRIVATE COMPANIES			MUNICIPAL PLANTS		
	Number	Kw. Hrs. Sold (ooo's Omitted)	Number of Customers	Number	Kw. Hrs. Sold (ooo's Omitted)	Number of Customers
Boston Edison.....	1	877,650	351,986	.....	.....	.....
Larger Plants.....	35	1,405,210	637,403	5	72,090	47,450
Smaller Plants.....	32	65,559	66,639	38	64,414	70,840
Total.....	68	2,348,419	1,056,028	43	136,504	118,290

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TABLE V. PERCENTAGE OF KILOWATT HOURS LOST AND UNACCOUNTED FOR TO TOTAL KILOWATT HOURS SOLD.

Number	PRIVATE COMPANIES		MUNICIPAL PLANTS	
	City	Percentage	Percentage	City
1	Boston Edison	17.6%		
2	New Bedford	9.5		
3	United, Springfield	10.4		
4	Salem	2.8		
5	Worcester	14.1		
6	Fall River	11.6		
7	Cambridge	10.9		
8	Brockton	18.5		
9	Malden	8.3		
10	Lynn	10.0		
11	Lowell	17.5		
12	Pittsfield	12.6		
13	Lawrence	19.4		
14	Haverhill	13.6		
15	Fitchburg	7.7		
16			11.8%	Holyoke
17	Worcester Suburban	8.7		
18	Central Mass., Palmer	13.5		
19	Greenfield	17.1		
20	Quincy	15.9		
21	Southeastern Mass.	6.0		
22	Abington and Rockland	10.7		
23	Union, Franklin	9.3		
24	Weymouth	8.6		
25	North Adams	8.9		
26			6.6	Chicopee
27	Charlestown	6.1		
28			21.5	Taunton
29	Webster and Southbridge	17.9		
30	Gardner	15.8		
31	Attleboro	13.7		
32			12.5	Westfield
33	Northampton	15.9		
34	Leominster	10.1		
35	Southern Berkshire	20.8		
36	Suburban, Revere	15.1		
37			9.4	Braintree
38	Gloucester	14.6		
39	Beverly	16.1		
40	Cape and Vineyard	32.6		
41	Athol	19.8		
42	Plymouth	21.4		
43	Marlboro	21.9		
44	Amesbury	14.5		
45	Milford	11.2		
46			14.2	Norwood
47			10.6	Peabody
48	Clinton	14.7		
49			22.2	Reading
50			18.1	Belmont
51			11.0	Wellesley
52			10.4	Wakefield
53			12.7	Danvers
54			10.5	Mansfield
55			17.8	North Attleboro
56	Middlesex County	27.3		
57	Spencer	5.3		
58	Adams	18.6		
59			17.3	Hudson
60			12.1	Concord
61	Easthampton	17.4		
62	Amherst	22.1		

TABLE V. (*Continued.*) PERCENTAGE OF KILOWATT HOURS LOST AND UNACCOUNTED FOR TO TOTAL KILOWATT HOURS SOLD.

Number	PRIVATE COMPANIES		MUNICIPAL PLANTS	
	City	Percentage	Percentage	City
63			14.1	Hull
64	Winchendon	17.3	20.8	Marblehead
65				
66	Ware	11.3		
67	Seekonk	16.1		
68			13.5	Hingham
69	Ayer	15.5		
70	Lee	16.2		
71			28.7	Middleboro
72			16.2	South Hadley
73			26.5	Shrewsbury
74	Randolph and Holbrook	28.1		
75	Williamstown	24.5		
76	Norton	14.1		
77			28.8	Ipswich
78	Manchester	20.2		
79	Ludlow	27.0		
80			17.1	Groton
81	Agawam	28.0		
82	Citizens, Nantucket	12.9		
83	Blackstone	21.7		
84			21.5	Merrimac
85	Mill River	12.7		
86	Provincetown	8.5		
87			25.6	West Boylston
88			25.9	Georgetown
89			20.8	Littleton
90			21.1	Templeton
91			22.4	Chester
92			43.9	Ashburnham
93			33.3	Sterling
94				
95	Charlemont	37.2		
96			25.2	Groveland
97			17.8	Southwick
98			19.9	Rowley
99			32.9	Middleton
100	Harvard	32.2		
101	Hampshire	28.2		
102			34.6	Boylston
103	Huntington	28.3		
104			61.5	Princeton
105			31.0	Paxton
106			23.2	Russell
107			23.3	Blandford
108	Leverett	9.8		
109			32.3	Granville
110	New Salem	28.5		
111	Western Mass., Hancock	31.7		

that because of the many variables too great reliance should not be placed on such figures. The wide variations shown in Table V make direct comparison of the two groups difficult. The following figures give the corresponding data for all plants having sales of less than 8,000,000 kw. hrs. in the year 1929.

	Private Companies	Municipal Plants
Number of establishments.	32	38
Kw. hrs. sold....	65,559,000	64,414,000
Kw. hrs. unaccounted for....	11,533,000	10,523,000
Percentage unaccounted for....	17.6%	16.4%

It should not be assumed from these figures that the municipal plants are more efficient than the private companies in this respect, since they may enjoy more favorable conditions. But certainly the figures do not on their face indicate any lesser efficiency for the municipal group.

Current Generated and Purchased

Whether it is wiser for a particular plant to generate or purchase is a question of engineering economics and the answer should be the same whether it be a private company or a municipal plant. As a result of technological advances and the consequent differential between cost of generation in large units and in small, it has ceased to be economically sound

for either a small private company or a small municipal plant to generate electricity by steam power, except under unusual conditions. Whether the improvements in the oil-using Diesel engine will change the situation appreciably, it is still too early to say positively. The fixed charges on reserve equipment, maintained as insurance against breakdowns, must, of course, be included in the costs of generation.

The substitution of purchased energy for steam power is in general an indication of sound judgment, as much so on the part of the municipal plant as on the part of the small private company. Table VI lists all establishments in Massachusetts generating any electricity in 1929. The remaining 39 private

TABLE VI. ESTABLISHMENTS GENERATING ELECTRICITY, 1929.

Number	City	PRIVATE COMPANIES			MUNICIPAL PLANTS			Percentage Generated By Steam Power	Percentage Generated By Oil Engine	Percentage Generated By Water Power	Percentage Purchased	Percentage Purchased	City
		Steam Power	Oil Engine	Water Power	Steam Power	Oil Engine	Water Power						
				*									
1	Boston Edison.....	95	.....	*	5	.....	.....	.....	.....	.....	.....	.....	.....
2	New Bedford.....	100	.....	12	35	.....	.....	.....	.....	.....	.....	.....	.....
3	United, Springfield.....	53	.....	4*	.....	.....	.....	.....	.....	.....	.....	.....	.....
4	Salem.....	100	.....	.....	18	.....	.....	.....	.....	.....	.....	.....	.....
5	Worcester.....	82	.....	.....	99	.....	.....	.....	.....	.....	.....	.....	.....
6	Fall River.....	1	.....	.....	20	.....	.....	.....	.....	.....	.....	.....	.....
7	Cambridge.....	80	.....	.....	91	.....	.....	.....	.....	.....	.....	.....	.....
8	Brockton.....	9	.....	.....	100	.....	.....	.....	.....	.....	.....	.....	.....
9	Malden.....	*	.....	.....	100	.....	.....	.....	.....	.....	.....	.....	.....
10	Lynn.....	99	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
11	Lowell.....	57	.....	.....	43	.....	.....	.....	.....	.....	.....	.....	.....
12	Pittsfield.....	12	.....	.....	88	.....	.....	.....	.....	.....	.....	.....	.....
13	Lawrence.....	33	.....	2	65	.....	.....	.....	.....	.....	.....	.....	.....
14	Haverhill.....	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
15	Fitchburg.....	86	.....	2	12	.....	.....	.....	.....	.....	.....	.....	.....
16	.....	.....	.....	.....	51	.....	.....	18	31	.....	.....	.....	.....
17	Central Mass., Palmer.....	7	93	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
18	Greenfield.....	64	36	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
19	Weymouth.....	*	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
20	.....	.....	.....	.....	97	.....	.....	.....	3	Taunton	.....	.....	.....
21	Webster and Southbridge.....	1	99	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
22	Southern Berkshire.....	24	76	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
23	Suburban, Revere.....	1	99	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
24	.....	.....	.....	.....	70	.....	.....	.....	30	Braintree	.....	.....	.....
25	Gloucester.....	67	33	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
26	Beverly.....	1	99	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
27	Cape and Vineyard.....	13	87	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
28	Athol.....	5	39	56	65	2	89	35	Peabody
29	100	8	98	Reading
30	97	8	92	Hudson
31	97	8	3	Concord
32	Winchendon.....	41	59	53
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66
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68
69
70
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74
75
76
77
78
79
80
81
82	Citizens, Nantucket.....	100	81	66	19	34
83	Provincetown.....
84	Huntington.....
85	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
86	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
87	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
88	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
89	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
90	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
91	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
92	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
93	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
94	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
95	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
96	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
97	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
98	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
99	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
101	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
102	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
103	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

*Less than 0.5 %.

establishments and 33 municipal plants purchased all the electrical current used.

The total kw. hrs. generated and purchased by all the compared establishments are given in Table VII with no adjustments made for duplication. In interpreting these data it should be noted that they do not include all current generated in Massachusetts and that some of the purchased current was generated outside of Massachusetts.

TABLE VII. COMPARISON OF KILOWATT HOURS GENERATED AND PURCHASED BY PRIVATE AND MUNICIPAL PLANTS.

	Private Companies (ooo's Omitted)	Municipal Plants (ooo's Omitted)
Generating Establishments		
Steam power.....	1,840,131	47,114
Oil engine.....	1,840	4,611
Water power.....	43,863	5,612
Purchased.....	612,032	25,037
Subtotal.....	2,497,866	82,374
Purchasing Establishments		
Subtotal.....	265,094	76,839
Total Kw. Hrs.	2,762,960	159,213

Why some of the companies should have generated any electricity may require a word of explanation. In the case of the Citizens' Gas, Electric and Power Company, it may be stated for the benefit of readers not acquainted with New England, that this Company operates on Nantucket, an island so far out in the Atlantic as to preclude the purchase of power. The Cape and Vineyard Electric Company generates only the electricity supplied on the Island of Martha's Vineyard. Provincetown is on the extreme tip of Cape Cod and most disadvantageously located for the purchase of current from any of the large generating plants. Of the municipal plants, Concord has contracted since January, 1930, to purchase all current from the Edison Electric Illuminating Company of Boston. The use of available water power already developed comes, of course, in a different category from generation of electricity by steam power on a small scale.

Four of the private companies, purchasing approximately 99% or more of their current, generated relatively insignificant quantities at considerable expense. The figures for these companies are shown in Table VIII. The reported cost for the current generated does not include any of the fixed charges for interest, depreciation, and taxes, nor does it include liability or other insurance. Presumably these companies secured a sufficiently more favorable price on the purchased portion of the current so that the average cost of all current was less than it would have been if all current had been purchased and no stand-by generating equipment had been maintained. Other factors than operating expense sometimes influence policy in this connection, as, for example, a disinclination to eliminate fixed property from the rate-base.

TABLE VIII. KILOWATT HOURS GENERATED AND COST OF GENERATION, FOR FOUR PRIVATE COMPANIES.

	Kw. Hrs. Generated	Reported Cost (Fixed Charges Omitted)	Cost Per Kw. Hr. (Cents)
Malden Electric Purchased.....	62,653,316	\$853,458	1.36
Generated.....	151,800	23,877	15.73
Total.....	62,805,116	877,335	1.40
Webster and Southbridge Purchased.....	14,367,220	134,151	0.93
Generated.....	97,400	49,295	50.60
Total.....	14,464,620	183,446	1.27
Suburban Gas and Electric Purchased.....	10,942,910	161,323	1.47
Generated.....	81,200	9,467	11.66
Total.....	11,024,110	170,790	1.55
Beverly Gas and Electric Purchased.....	9,806,720	116,234	1.19
Generated.....	118,500	35,260	29.76
Total.....	9,925,220	151,494	1.53

The values at which these companies carried steam generating equipment, exclusive of structures, on their balance sheets were as follows:

Malden Electric..... \$466,662.14
Webster and Southbridge..... 299,702.84
Suburban Gas and Electric..... 241,839.37
Beverly Gas and Electric..... 194,888.38

Purchasing Establishments

The establishments purchasing all electricity sold are listed in Table IX, which shows also the kw. hrs. purchased and the average price paid per kw. hr. purchased. This cost is one of the most directly comparable and any excess price paid must inevitably be reflected in the price to the consumer. The effect of the added load of the purchasing plant on the annual load factor of the generating plant and more particularly on the peak load of the generating plant has an important bearing on the equitable price. Since we are considering here only plants which purchase all their requirements, there is a very considerable degree of uniformity in these effects. While transmission voltage, distance from generating stations, and similar physical factors naturally affect the price, it should in general vary inversely as the quantity bought. (See also Chart II.)

Another differentiating factor is the relation between the buyer and seller. A generating company may sell at a somewhat more than normal price or at a somewhat less than normal price to a purchasing company controlled by the same management. A private company may exact a higher price from a municipal plant than from another private company. For example, the Weymouth Light and Power Company charged the Hull and Hingham municipal plants a higher price per kw. hr. for a larger quantity than it did the Randolph and Holbrook Company, also controlled by the Massachusetts Utilities Associates, for a smaller quantity:

Purchasing Establishment	Kw. Hrs. Purchased	Price Per Kw. Hr.
Hull.....	2,563,130	2.50¢
Hingham.....	2,118,591	2.74¢
Randolph and Holbrook.....	1,744,150	2.12¢

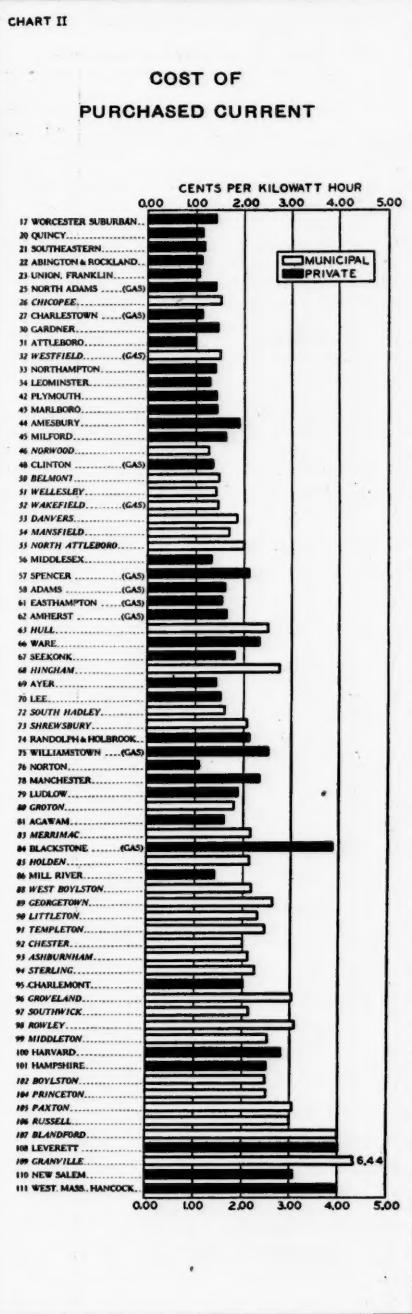


TABLE IX. ESTABLISHMENTS PURCHASING ALL ELECTRICITY SOLD, 1929.

Number	PRIVATE COMPANIES			MUNICIPAL PLANTS		
	City	Total Kw. Hrs. Purchased (ooo Omitted)	Average Cost per Kw. Hr. (Cents)	Average Cost per Kw. Hr. (Cents)	Total Kw. Hrs. Purchased (ooo Omitted)	City
17	Worcester Suburban.....	27,791	1.41			
20	Quincy.....	23,757	1.13			
21	Southeastern.....	21,368	1.16			
22	Abington and Rockland.....	20,898	1.11			
23	Union, Franklin.....	18,302	1.06			
25	North Adams.....(Gas)	15,573	1.40			
26				1.50	14,757	Chicopee
27	Charlestown.....(Gas)	13,887	1.12			
30	Gardner.....	13,586	1.45			
31	Attleboro.....	12,703	0.96			
32				1.50	12,462	Westfield (Gas)
33	Northampton.....	12,305	1.40			
34	Leominster.....	11,451	1.28			
42	Plymouth.....	9,186	1.42			
43	Marlboro.....	8,499	1.42			
44	Amesbury.....	7,951	1.90			
45	Milford.....	7,281	1.60			
46				1.25	7,402	Norwood
48	Clinton.....(Gas)	6,093	1.35			
50				1.47	5,065	Belmont
51				1.41	4,627	Wellesley
52				1.44	4,558	Wakefield (Gas)
53				1.84	4,548	Danvers
54				1.68	4,090	Mansfield
55				2.00	3,632	North Attleboro
56	Middlesex.....	3,806	1.32			
57	Spencer.....(Gas)	3,145	2.11			
58	Adams.....(Gas)	3,503	1.60			
61	Easthampton.....(Gas)	2,909	1.53			
62	Amherst.....(Gas)	2,873	1.63			
63				2.50	2,565	Hull
66	Ware.....	2,299	2.32			
67	Seekonk.....	2,216	1.80			
68				2.74	2,122	Hingham
69	Ayer.....	2,146	1.41			
70	Lee.....	2,133	1.52			
72				1.60	1,909	South Hadley
73				2.07	1,962	Shrewsbury
74	Randolph and Holbrook.....	1,744	2.12			
75	Williamstown.....(Gas)	1,403	2.50			
76	Norton.....	1,238	1.06			
78	Manchester.....	959	2.33			
79	Ludlow.....	977	1.88			
80				1.80	870	Groton
81	Agawam.....	931	1.60			
83	Blackstone.....(Gas)	711	3.86			
84				2.15	793	Merrimac
85				2.13	660	Holden
86	Mill River.....	595	1.40			
88				2.16	559	West Boylston
89				2.61	552	Georgetown
90				2.30	471	Littleton
91				2.45	451	Templeton
92				2.00	404	Chester
93				2.11	422	Ashburnham
94				2.25	331	Sterling
95	Charlemont.....	332	2.01			
96				3.03	293	Groveland
97				2.13	265	Southwick

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TABLE IX. (*Continued.*) ESTABLISHMENTS PURCHASING ALL ELECTRICITY SOLD, 1929

Number	City	PRIVATE COMPANIES		MUNICIPAL PLANTS	
		Total Kw. Hrs. Purchased (⁰⁰⁰ Omitted)	Average Cost per Kw. Hr. (Cents)	Average Cost per Kw. Hr. (Cents)	Total Kw. Hrs. Purchased (⁰⁰⁰ Omitted)
98		.....	.....	3.07	254
99		.....	.....	2.52	220
100	Harvard	211	2.79	.....	Rowley
101	Hampshire	185	2.50	.....	Middleton
102		.....	.....	2.46	181
104		.....	.....	2.50	Boylston
105		.....	.....	3.04	Princeton
106		.....	.....	3.00	Paxton
107		.....	.....	4.00	Russell
108	Leverett	30	4.01	.....	Blandford
109		.....	.....	6.44	.....
110	New Salem	26	3.07	.....	Granville
111	Western Mass., Hancock	11	4.00	.....	.....
	Total	265,094		76,839	

Chart II, which shows graphically the same average prices paid per kw. hr. which appear in Table IX, brings out much more clearly the apparent inconsistencies. For many of these there is doubtless an adequate explanation in local physical or operating conditions, but any municipal plant paying a higher price per kw. hr. than smaller purchasing companies are paying should study the situation with care. It may be that an intelligent quotation of precedents or a potential competitive supply will secure a more favorable contract.

The cost of purchased electricity per kw. hr. *sold* will, of course, be higher than the cost per kw. hr. *purchased* shown in the table because of the current lost and unaccounted for. The cost per kw. hr. to companies purchasing only a part of the electricity sold has not been shown, as the price is materially affected by the particular conditions. For example, the Reading municipal plant buys the greater portion of its requirements from Boston Edison, but generates during the Edison peak load from three o'clock to five. It thereby secures from

the Edison Company a more favorable rate (not shown in Table IX), which cannot fairly be compared with the price charged by the Edison Company to Norwood or Wellesley. Incidentally it should be noted that the maximum residential lighting load does not occur during the peak of the Edison system.

It is not feasible to compare the cost of current to the generating establishments with that to the purchasing establishments. The annual cost of the capital invested in the generating plant, depreciation of the generating plant, and taxes on it are three large items entering into the cost of producing electricity, no one of which is shown separately on the annual reports. Any figures on the cost of generating electricity which do not include these items are worthless and it is not the province of this article to make arbitrary cost allocations which would be unsatisfactory to the author and unacceptable to the reader.

Of the establishments purchasing all electricity sold in 1929, only the following carry any investment in steam generating equipment on their balance

sheets. The figures which are given here do not include structures.

Private Companies

Amesbury.....	\$68,754.80
Middlesex.....	1,650.00
Northampton.....	8,418.44
Quincy.....	59,297.52
Ware.....	2,750.00
Worcester Suburban....	66,494.61

Municipal Plants

Danvers.....	\$14,209.91
Merrimac.....	6,079.53
North Attleboro.....	12,171.58

New legislation passed by the 1930 Legislature was ostensibly intended to give the Public Utility Commission greater control of interconnection contracts than it has had in the past. Chapter 342 provides that any contract for a period greater than two years made by an electric company for the purchase of electricity must contain a clause providing for review by the Commission. Apparently this does not cover municipal plants. Neither will it prevent a one-sided, unfair contract for two years between two companies controlled by the same management and the repeated renewal of such a contract. Presumably no management would consider the adoption of such a policy worth while, but the act as it stands does not prevent it.

Chapter 383 empowers the Commission to order a larger company to supply electricity in bulk to a smaller company or to a municipal plant "upon such terms and conditions as are legal and reasonable." This may perhaps give to the municipal plants the protection which Chapter 342 may fail to give.

In the long run there should be no unreasonable variation in the prices paid for electricity under similar conditions by purchasing establishments, whether private companies or municipal plants. Both will secure their supply from the same large inter-connected generating

plants. Such unwarranted variations as now exist should be ironed out as present contracts expire, either voluntarily by the companies or by action of the Commission. It would not be surprising if some of the other large generating companies should follow the example of the Boston Edison Company and substitute generally applicable wholesale rates for all special contracts.

Comparative Costs

It would be possible to present comparative tables showing the cost per kilowatt-hour for each item in the official expense classification. Such tables would, however, be of less than doubtful value. In the first place, there are variations dependent on the extent to which the company purchases or generates its current. Secondly, there are for the combined gas and electric companies possible errors in allocation between the two services. In the case of the municipal plants the electric department may in some instances be carrying a part of the expense of the water department, or vice versa, or may not be charged rent for the office it occupies in the town hall or for other items. In the next place, there are legitimate variations dependent on the character of the territory, density of customers, proportion and concentration of power load, and similar factors. Last, but by no means least, are the variations caused by different establishments reporting expenses of identical character under different headings. In one company a few years ago a new accounting officer shifted approximately \$100,000 of salaries from the classification "Salaries of General Office Clerks," where it had been reported in previous years, to the expense account, "Commercial Salaries," to which he believed it was more appropriately charged. It must also be remembered that certain expenses are more dependent on the

number of customers than they are on the number of kilowatt hours sold.

The net result of any comparison of detailed expenses would be that we should not consider the minor variations significant because of their smallness and that we should not consider the larger variations significant because they might be attributable to one of the causes enumerated above rather than to more or less efficient management.

Transmission and Distribution Expense

To show the wide range within which unit costs may vary it may be worth while to present Table X, showing the total cost, other than fixed charges, of the major expense group called "Transmission, Distribution and Storage," to which has been added "Utilization Expense." The larger portion of the latter is for street lighting expense other than the cost of current; the smaller portion is for servicing consumers' installations in one way or another. The reason for combining these two groups is that the detailed figures indicate that some of the establishments failed to differentiate clearly between them and that, since both are outside expenses as distinct from office expenses, they are not likely to include items which should be reported elsewhere.

Unfortunately, reliable figures are not available which would separate the cost of distribution from the cost of transmission. As a result of combining the two, such a company as the Southeastern Massachusetts, which sold 14,280,286 kw. hrs. to other companies and distributed only 5,853,712 kw. hrs., has a much lower average cost per kw. hr. than would a company distributing 20,000,000 kw. hrs. to small consumers and having no large customers. Conversely, this condition increases the average cost of these expense groups per customer.

A residential town like Wellesley with a large proportion of single-family houses on good sized lots naturally has a higher cost per customer than a manufacturing town with many multiple-family houses crowded together. So, too, a town which has a large number of summer residents, whether supplied with electricity by a private company or by a municipal plant, will have a higher distribution cost per kw. hr. than a town with the same number of consumers who use electricity all the year round. For the smallest establishments the variations caused by local conditions are magnified and there are superimposed variations attributable to cost allocations. For example, the Chester municipal plant reports an abnormally low distribution expense and an abnormally high general expense. The total for the two is only slightly larger than the average for all municipal plants. Holden, on the other hand, reports a high distribution expense and a low general expense. This situation is much more likely to arise when one individual has several dissimilar functions than when each employee devotes all his time to a specialized field.

Table X shows also the average cost both per kw. hr. and per customer. Since the distribution costs are much more largely determined by the number of customers than by the number of kw. hrs. sold, the average cost per customer is distinctly more uniform than is the average cost per kw. hr. The reports to the Commission call for the number of customers on December 31. Certain companies and towns have more customers in the summer than in the winter and, although adjustments have been made in most instances, a few of the higher figures in the table may be caused by dividing the expense by too small a number of customers. On the other hand, some customers who have two

TABLE X. TOTAL COST OF TRANSMISSION, DISTRIBUTION,
STORAGE, AND UTILIZATION EXPENSE, 1929.
(FIXED CHARGES OMITTED)

TABLE X. (*Continued.*) TOTAL COST OF TRANSMISSION,
DISTRIBUTION, STORAGE, AND UTILIZATION EXPENSE, 1929.
(FIXED CHARGES OMITTED)

Number	City	PRIVATE COMPANIES			MUNICIPAL PLANTS		
		Total Reported	Average Cost Per Kw. Hr. Sold (Cents)	Average Per Customer	Average Per Customer	Average Cost Per Kw. Hr. Sold (Cents)	Total Reported
78	Manchester	\$5,896	0.74	\$5.12	.....	.....	.....
79	Ludlow	6,417	0.83	3.91	.....	.....	.....
80	Agawam	6,796	0.93	4.09	\$4.74	0.41	\$3,079
81	Citizens, Nantucket (Gas)	4,921	0.72	2.53	.....	.....	.....
83	Blackstone (Gas)	6,579	1.14	4.18	1.40	0.17	1,122
85	Mill River	2,908	0.55	6.12	9.98	2.00	10,720
87	Provincetown	3,596	0.76	2.77	.....	.....	.....
88	Charlemont	1,306	0.54	5.99	11.24	1.32	5,892
89	Harvard	1,405	0.88	4.31	8.32	1.28	5,606
90	Hampshire	1,506	1.05	8.61	4.04	0.51	1,975
91	Huntington	771	0.71	2.66	3.17	0.77	2,843
92	Leverett	256	0.92	3.88	1.61	0.12	387
93	New Salem	860	4.26	11.02	14.70	2.69	7,879
94	Western Mass., Hancock	319,862	.....	.....	9.94	1.90	4,763
95	Total	\$8,413,169	0.36	\$7.97	.....	.....	.....
96	Larger Plants	4,131,399	.....	6.48	3.24	1.48	340,173
97	Smaller Plants	319,862	.....	4.80	7.74	.....	548,168

meters may be counted twice. The Commission might well provide for reporting the maximum number of customers at any time during the year, as well as the detailed figures as of December 31.

After making due allowance for the various factors enumerated, a study of Table X indicates that on the whole the municipal plants have higher distribution costs than the private companies. The weighted average for all companies is \$8.01 per customer as against \$7.52 for municipal plants but, if the Boston Edison Company with its many miles of expensive underground construction be eliminated, the average for all other companies is very much less. If the larger and smaller plants are averaged separately a fairer comparison may be

made. The figures are as follows:

	Private Companies		Municipal Plants	
	Num- ber	Average Per Customer	Num- ber	Average Per Customer
Boston Edison..	1	\$11.26	.....	.....
Larger Plants..	35	6.48	5	\$7.17
Smaller Plants..	32	4.80	38	7.74

To what extent the poorer showing of the municipal plants is attributable to lower customer density, to poorer line construction, and to politics or to use of the municipal electric utility as a substitute for poor relief, it is impossible to say without a detailed study of each town.

New Business Expense

The expense group showing the greatest diversity, between municipal plants

TABLE XI. NEW BUSINESS EXPENSE, 1929.

Number	PRIVATE COMPANIES			MUNICIPAL PLANTS		
	City	Total Reported	Average Per Customer	Average Per Customer	Total Reported	City
1	Boston Edison.....	\$664,111	\$1.89	.....	.....	.....
2	New Bedford.....(Gas)	8,086	0.20	.....	.....	.....
3	United, Springfield.....	112,921	2.18	.....	.....	.....
4	Salem.....	19,637	1.66	.....	.....	.....
5	Worcester.....	48,724	0.88	.....	.....	.....
6	Fall River.....	26,853	0.82	.....	.....	.....
7	Cambridge.....	106,046	3.16	.....	.....	.....
8	Brockton.....	97,369	3.31	.....	.....	.....
9	Malden.....	44,291	0.87	.....	.....	.....
10	Lynn.....(Gas)	25,313	0.63	.....	.....	.....
11	Lowell.....	111,579	3.92	.....	.....	.....
12	Pittsfield.....	23,186	1.55	.....	.....	.....
13	Lawrence.....(Gas)	33,370	1.01	.....	.....	.....
14	Haverhill.....(Gas)	24,444	1.28	.....	.....	.....
15	Fitchburg.....(Gas)	15,872	1.27	.....	.....	.....
16	Worcester Suburban.....	26,139	2.32	.....	.....	.....
17	Central Mass., Palmer.....	14,268	1.55	.....	.....	.....
18	Greenfield.....	35,994	3.43	.....	.....	.....
19	Quincy.....	5,540	0.25	.....	.....	.....
20	Southeastern.....	6,705	1.18	.....	.....	.....
21	Abington and Rockland.....	34,110	4.07	.....	.....	.....
22	Union, Franklin.....	5,398	1.20	.....	.....	.....
23	Weymouth.....	5,602	0.85	.....	.....	.....
24	North Adams.....(Gas)	6,488	1.05	.....	.....	.....
25	Charlestown.....(Gas)	1,039	0.17	.....	.....	Chicopee
26	Webster and Southbridge ..(Gas)	6,990	0.70	0.77	8,315	Taunton
27	Gardner.....	9,815	1.31	.....	.....	.....
28	Attleboro.....	4,913	0.77	.....	.....	Westfield (Gas)
29	Northampton.....	6,826	1.07	.....	.....	.....
30	Leominster.....	5,116	0.89	.....	.....	.....
31	Southern Berkshire.....	6,335	1.25	.....	.....	.....
32	Suburban, Revere.....(Gas)	12,598	0.84	.....	.....	.....
33	Gloucester.....	13,020	1.25	.....	.....	Braintree
34	Beverly.....(Gas)	7,929	0.90	.....	.....	.....
35	Cape and Vineyard.....	44,775	3.63	.....	.....	.....
36	Athol.....(Gas)	12,015	2.35	.....	.....	.....
37	Plymouth.....	3,997	0.48	.....	.....	.....
38	Marlboro.....	13,554	1.59	.....	.....	.....
39	Amesbury.....	8,151	1.75	.....	.....	.....
40	Milford.....	2,878	0.61	.....	.....	.....
41	Clinton.....(Gas)	4,114	0.95	0.12	791	Norwood
42	.....	.....	.....	0.93	4,874	Peabody
43	.....	.....	.....	.....	.....	Reading
44	.....	.....	.....	0.18	791	Belmont
45	.....	.....	.....	0.44	1,332	Wellesley
46	.....	.....	.....	0.14	287	Wakefield (Gas)
47	.....	.....	.....	.....	.....	Danvers
48	.....	.....	.....	.....	.....	Mansfield
49	.....	.....	.....	.....	.....	North Attleboro
50	.....	.....	.....	.....	.....	.....
51	.....	.....	.....	.....	.....	.....
52	.....	.....	.....	.....	.....	.....
53	.....	.....	.....	.....	.....	.....
54	.....	.....	.....	.....	.....	.....
55	.....	.....	.....	.....	.....	.....
56	Middlesex County.....	5,071	3.55	.....	.....	.....
57	Spencer.....(Gas)	2,259	1.27	.....	.....	.....
58	Adams.....(Gas)	2,500	0.72
59	0.04	110	Hudson
60	Concord
61	Easthampton.....(Gas)	2,473	0.87

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TABLE XI. (*Continued.*) NEW BUSINESS EXPENSE, 1929.

Number	PRIVATE COMPANIES			MUNICIPAL PLANTS		
	City	Total Reported	Average Per Customer	Average Per Customer	Total Reported	City
62	Amherst.....(Gas)	\$2,899	\$0.87	\$0.10	\$35	Hull
63	Winchendon.....	1,827	1.25			Marblehead
64						
65	Ware.....	3,353	1.50			
66	Seekonk.....	858	0.55			
67						
68						
69	Ayer.....	508	0.51			Hingham
70	Lee.....	714	0.65			
71						
72						
73						
74	Randolph and Holbrook.....	1,404	0.47			Middleboro (Gas)
75	Williamstown.....(Gas)	1,099	0.71			South Hadley
76	Norton.....	231	0.39			Shrewsbury
77						
78	Manchester.....	2,078	1.81			Ipswich
79	Ludlow.....	3,552	2.16			
80						
81	Agawam.....	3,117	1.87			Groton
82	Citizens, Nantucket.....(Gas)	1,846	0.95			Merrimac
83						
84	Blackstone.....(Gas)	2,582	1.64			Holden
85						
86	Mill River.....	50	0.11			West Boylston
87	Provincetown.....	409	0.31			Georgetown
88						Littleton
89						Templeton
90						Chester
91						Ashburnham
92						Sterling
93						
94						
95	Charlemont.....					Groveland
96						Southwick
97						Rowley
98						Middleton
99						
100	Harvard.....	32	0.10			Boylston
101	Hampshire.....	92	0.52			
102						Princeton
103	Huntington.....					Paxton
104						Russell
105						Blandford
106						
107						
108	Leverett.....	31	0.47			Granville
109						
110	New Salem.....	9	0.12			
111	Western Mass., Hancock.....	1	0.04			
	Total.....	\$1,704,206	\$1.61	\$0.15	\$17,837	

and private establishments as well as between different private companies of similar size is new business expense.

By far the larger portion of this expense is incurred in the endeavor to in-

crease domestic consumption. Practically none of it can logically be allocated to the kw. hrs. sold to other companies and only a very small fraction to the cost of selling to the larger industrial

consumers. The average cost per customer is a much more significant figure than the average cost per kw. hr. Table XI shows, therefore, the total amount reported and the average cost per customer.

Although the private companies spent on the average \$1.62 per customer, a majority of the municipal plants are not incurring any expense for this purpose. Only two, Reading and Taunton, spent more than 50 cents per customer per year, and both of these spent less than \$1.00. Obviously, the electricity sold by municipal plants is sold because of the self-evident convenience of electricity and not as a result of high pressure salesmanship. Many consumers in municipal territory are overlooking opportunities to reduce the drudgery of home-making, in spite of the advertisements of vacuum cleaners, refrigerators, et cetera, seen in every magazine and newspaper and heard over every radio. The Reading municipal plant ran an advertising campaign in 1929 in the two local weekly newspapers featuring the 2.7 cent rate for electricity in excess of 50 kw. hrs. per month. The sales of electricity in kw. hrs. jumped 20%. The management estimate that half of this increase can be fairly attributed to the special advertising campaign.⁶ Other municipal plants might be wise to add an extra five cents per family per month to the municipal electricity bill to make the consumers electricity conscious. If the effort be successful, the consequent increase in consumption should result in a reduction in unit costs amounting to more than 60 cents per customer per year.

The managers of the private companies must have very diverse views as to

⁶ Two examples of this advertising are reproduced here (pp. 414 and 415).

⁷ The selling of a new rate form to customers may necessitate a considerable increase temporarily in publicity expense.

EVERY MONTH THE READING MUNICIPAL LIGHT DEPARTMENT OFFERS ELECTRICITY TO EVERY HOUSEHOLD AT THE BARGAIN PRICE OF 2.7 AND 1.8 CENTS.

ADVANCE NOTICE IS SENT TO ALL CUSTOMERS WHO HAVE CHARGE ACCOUNTS. (IT IS ON THE BACK OF THE BILL.)

**THE FIRST 25 KWHRS. COSTS 7.2 CENTS
THE NEXT 25 KWHRS. COSTS 4.5 CENTS
THE NEXT 150 KWHRS. IS OFFERED AT THE BARGAIN PRICE OF 2.7 CENTS
ALL THE REST COSTS ONLY 1.8 CENTS !**

AND THERE IS NO LIMIT TO THE AMOUNT WHICH ONE PERSON CAN GET AT 1.8 CENTS

EVERY MONTH !

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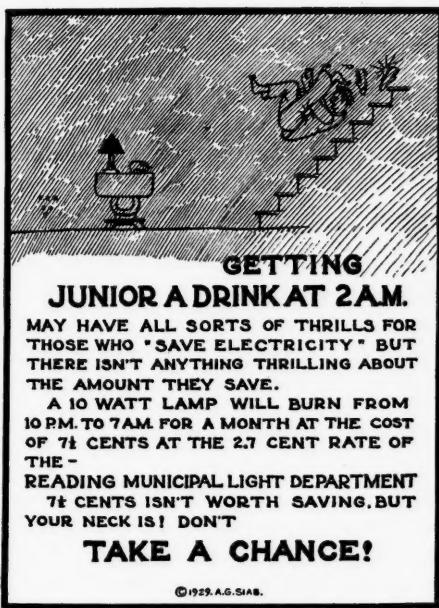
Reproduced through courtesy of Mr. A. G. Sias, manager of the Reading plant.

the relative effectiveness of a reduction in domestic rates and direct selling pressure.⁷ For example, among the larger and medium sized companies we find:

Company	Number of Customers	New Business Expense	Cost Per Customer
Worcester..	55,393	\$48,724	\$0.88
Cambridge.	33,555	106,046	3.17
Lynn.....	40,114	25,313	0.63
Lowell.....	28,460	111,579	3.92
Cape and Vineyard.	12,350	44,775	3.63
Plymouth..	8,225	3,997	0.48

New business expense is a cost which the companies recover from their customers in the rates charged. In other words, present customers pay for all this expenditure. If the company keeps the whole of the profit on the additional volume, it is questionable if the larger expenditures are justifiable. If as a result of regulation the company shares the additional profit with the customers

through reduced rates, the possible reduction may be less than the amount expended for new business. Looking at the matter from a purely business standpoint, it is a well recognized fact that in many lines it is not worth while to increase the volume beyond a certain point because the cost of getting the additional volume is greater than the profit which can be derived therefrom. It seems very possible that the companies spending the larger amounts per customer are paying more for new business than it is worth except on the basis of a conscious or unconscious philosophy of "heads, the company wins; tails, the customer loses."



Courtesy of A. G. Sias, manager of the Reading Plant.

Since the Commission normally assumes that all expenses have been incurred as a result of sound business judgment, the companies know that the present customers must pay the freight whether the

⁸ The investigation by the New Hampshire Public Service Commission of the New Hampshire Gas and Electric Company and the Derry Electric Company, properties owned by the New England Gas and Electric

expenditures are productive or the reverse. If the expenditures prove profitable, the stockholders gain because of the lag in rate reduction. If not, the customers have paid. Why worry?

Several companies which apparently maintain expensive show rooms and numerous salesmen for appliances report not one cent of appliance sales to the Commission. Are the costs of these show rooms and the salaries and commissions of these salesmen charged to new business expense or are they paid for by some unobtrusive separate corporation?⁸ If they are charged to new business expense, who gets the margin between the cost of the appliances sold and the price charged the consumer? Logically this margin should be used to pay the cost of retail selling. If it is being diverted while the consumer is saddled with the selling cost, the practice may or may not be legally permissible, but it is certainly deserving of condemnation.

During the past winter legislation has been proposed in half a dozen states to prohibit the sale of appliances by utility companies. In general, the legislative bills have been backed by competing dealers in appliances. If a few of the companies adopt any such policy as that suggested above, it will provide the appliance dealers with additional ammunition and the innocent companies may suffer with the guilty.

President J. F. Owens of the National Electric Light Association has said:

"There should be segregation of the accounting of the merchandising departments of Power Companies from their public utility functions and all items of expense incurred in the merchandising of appliances should be charged to the merchandising activities."⁹

Association, disclosed that the appliance business of the Associated system was handled through a separate corporation, the Associated Appliance Corporation. (See *United States Daily*, July 1, 1931, p. 7.)

⁹ *N. E. L. A. Bulletin*, July, 1931, p. 448.

There would be much more opportunity to draw positive conclusions as to how large expenditures for new business are economically justifiable, if the returns to the Commission included, as they should, a statement of the number of kw. hrs. sold under each rate-schedule and the corresponding number of customers and dollars of revenue. Such detail figures over a term of years would be very helpful, both in this and in other connections. It is unfortunate that the Commission has up to the present not appreciated the need for these data.

Commercial and General Expense

Commercial expense and general expense are nominally separate expense classifications but must be considered as a single unit because of lack of uniformity in the allocation of costs. The Charlestown Gas and Electric Company, with a gross revenue from electricity of almost half a million dollars and over 6,000 customers, reports no "commercial expense" whatsoever. A shift by one company of \$100,000 from one classification to the other was mentioned earlier in this article.

Commercial expense is practically 100% proportional to the number of customers and is entirely independent of the number of kw. hrs. sold. General expense includes salaries of officers, salaries of general office clerks (those not included under commercial expense), management fees, legal expenses, insurance, and miscellaneous items. Management fees are usually computed as a definite percentage of gross revenue and therefore average a much higher figure per kw. hr. of domestic sales than per kw. hr. sold to large power users. The other items are not directly proportional either to the number of customers or to the quantity of electricity sold, but it can

fairly be said that in general they would be much more affected by an increase of 25% in the number of customers than by a 25% increase in the quantity of electricity sold to present customers. Table XII therefore shows the average cost per customer for these combined expense groups rather than an average cost per kw. hr.

Even though the distinction between commercial and general expense is not sufficiently sharp to be usable, it should be possible to break down the combined total at least into (a) salaries and wages; (b) management fees; (c) other expenses. The Massachusetts classification of accounts was set up when most of the companies were still independent and the holding corporation with its affiliated management company played a much smaller part than at present. Consequently, the reports to the Commission do not segregate management fees. It is much to be hoped that this information will be required in the reports for 1931. Salaries other than those of officers are now reported separately by the larger companies, but not by the smaller establishments. Since the distinction between salaries and other items of expense is clean cut, it might well be carried through all reports and prove a useful unit for comparison.

For all municipal plants the average cost per customer for commercial and general expense is \$5.10 and with very few exceptions the averages for the individual plants are close to this figure.¹⁰ The average for all private companies is \$8.49, or 67% higher. The figures for some of the private companies are far higher than the average for all.

The high figure of the Concord municipal plant is probably attributable to

¹⁰ Some of the municipal plants may not be charged with the full amount of rent or services of other town

departments properly allocatable to the electric department. This is much more likely to be the case in the smallest towns than it is in the larger ones.

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TABLE XII. COMMERCIAL AND GENERAL EXPENSE, 1929.
(DEPRECIATION NOT INCLUDED)

Number	PRIVATE COMPANIES			MUNICIPAL PLANTS		
	City	Total Reported	Average Per Customer	Average Per Customer	Total Reported	City
1	Boston Edison.....	\$3,237,614	\$9.20			
2	New Bedford.....(Gas) ..	238,387	5.82			
3	United, Springfield.....	374,663	7.22			
4	Salem.....	147,880	12.48			
5	Worcester.....	437,884	7.91			
6	Fall River.....	208,364	6.36			
7	Cambridge.....	334,985	9.98			
8	Brockton.....	301,709	10.25			
9	Malden.....	322,546	6.37			
10	Lynn.....(Gas) ..	265,912	6.63			
11	Lowell.....	244,104	8.58			
12	Pittsfield.....	153,950	10.31			
13	Lawrence.....(Gas) ..	181,848	5.53			
14	Haverhill.....(Gas) ..	190,558	9.98			
15	Fitchburg.....(Gas) ..	109,507	8.74			
16				\$4.31	\$69,979	Holyoke (Gas)
17	Worcester Suburban.....	98,516	8.73			
18	Central Mass., Palmer.....	77,627	8.44			
19	Greenfield.....	104,636	10.23			
20	Quincy.....	136,406	6.27			
21	Southeastern.....	54,795	9.61			
22	Abington and Rockland.....	134,677	16.09			
23	Union, Franklin.....	60,989	13.52			
24	Weymouth.....	82,591	12.57			
25	North Adams.....(Gas) ..	52,892	8.51			
26				4.31	42,677	Chicopee
27	Charlestown.....(Gas) ..	50,451	8.08			
28				4.34	46,776	Taunton
29	Webster and Southbridge (Gas) ..	80,850	8.06			
30	Gardner.....	81,943	10.97			
31	Attleboro.....	58,013	9.07			
32				4.27	24,308	Westfield (Gas)
33	Northampton.....	51,015	8.00			
34	Leominster.....	42,879	7.42			
35	Southern Berkshire.....	54,868	10.87			
36	Suburban, Revere.....(Gas) ..	91,951	6.10			
37				7.80	37,768	Braintree
38	Gloucester.....	93,908	9.01			
39	Beverly.....(Gas) ..	62,379	7.05			
40	Cape and Vineyard.....	140,171	11.35			
41	Athol.....(Gas) ..	41,890	8.19			
42	Plymouth.....	48,931	5.95			
43	Marlboro.....	66,430	7.81			
44	Amesbury.....	41,618	8.94			
45	Milford.....	33,827	7.22			
46				9.22	40,402	Norwood
47	Clinton.....(Gas) ..	29,452	6.79		23,312	Peabody
48				3.56		
49				7.91	41,312	Reading
50				5.16	34,267	Belmont
51				4.10	13,999	Wellesley
52				3.75	16,746	Wakefield (Gas)
53				6.61	19,961	Danvers
54				4.76	9,890	Mansfield
55				3.79	11,233	North Attleboro
56	Middlesex County.....	15,735	11.01			
57	Spencer.....(Gas) ..	14,904	8.40			
58	Adams.....(Gas) ..	20,077	5.82			
59				4.73	13,807	Hudson
60				11.99	20,012	Concord

TABLE XII. (*Continued.*) COMMERCIAL AND GENERAL EXPENSE, 1929.
(DEPRECIATION NOT INCLUDED)

Number	PRIVATE COMPANIES			MUNICIPAL PLANTS		
	City	Total Reported	Average Per Customer	Average Per Customer	Total Reported	City
61	Easthampton.....(Gas).	\$24,572	\$8.61	.....	.....	.....
62	Amherst.....(Gas).	37,556	11.20	.....	.....	.....
63	.....	.....	.....	.....	.....	.....
64	Winchendon.....	15,059	10.35	6.34	\$21,735	Hull
65	.....	.....	.....	.....	.....	.....
66	Ware.....	18,723	8.37	4.67	18,301	Marblehead
67	Seekonk.....	12,921	8.33	.....	.....	.....
68	.....	.....	.....	.....	.....	.....
69	Ayer.....	12,127	12.29	5.44	14,196	Hingham
70	Lee.....	19,174	17.43	.....	.....	.....
71	.....	.....	.....	4.20	11,028	Middleboro (Gas)
72	.....	.....	.....	6.05	10,963	South Hadley
73	.....	.....	.....	4.33	10,131	Shrewsbury
74	Randolph and Holbrook.....	20,559	6.89	.....	.....	.....
75	Williamstown.....(Gas).	10,960	7.12	.....	.....	.....
76	Norton.....	9,156	15.44	.....	.....	.....
77	.....	.....	.....	3.07	5,167	Ipswich
78	Manchester.....	18,246	15.85	.....	.....	.....
79	Ludlow.....	16,361	9.97	13.49	8,755	Groton
80	.....	.....	.....	.....	.....	.....
81	Agawam.....	16,224	9.76	.....	.....	.....
82	Citizens, Nantucket.....(Gas).	23,008	11.82	.....	.....	.....
83	.....	.....	.....	5.96	4,790	Merrimac
84	Blackstone.....(Gas).	11,617	7.38	.....	.....	.....
85	.....	.....	.....	1.78	1,907	Holden
86	Mill River.....	3,240	6.82	.....	.....	.....
87	Provincetown.....	7,532	5.79	.....	.....	.....
88	.....	.....	.....	5.16	2,705	West Boylston
89	.....	.....	.....	3.92	2,643	Georgetown
90	.....	.....	.....	5.85	2,862	Littleton
91	.....	.....	.....	4.84	4,342	Templeton
92	.....	.....	.....	13.26	3,197	Chester
93	.....	.....	.....	4.34	2,324	Ashburnham
94	.....	.....	.....	3.22	1,544	Sterling
95	Charlemont.....	3,426	15.72	.....	.....	.....
96	.....	.....	.....	4.14	2,507	Groveland
97	.....	.....	.....	6.35	2,331	Southwick
98	.....	.....	.....	1.76	694	Rowley
99	.....	.....	.....	3.65	1,050	Middleton
100	Harvard.....	2,760	8.47	.....	.....	.....
101	Hampshire.....	2,809	16.05	.....	.....	.....
102	.....	.....	.....	3.07	941	Boylston
103	Huntington.....	2,897	9.99	.....	.....	.....
104	.....	.....	.....	2.42	629	Princeton
105	.....	.....	.....	1.34	251	Paxton
106	.....	.....	.....	6.78	969	Russell
107	.....	.....	.....	4.96	417	Blandford
108	Leverett.....	931	14.11	.....	.....	.....
109	.....	.....	.....	3.05	320	Granville
110	New Salem.....	353	4.53	.....	.....	.....
111	Western Mass., Hancock.....	288	11.52	.....	.....	.....
	Total.....	\$8,964,831	\$8.49	\$5.10	\$603,148	

the cost of an exhaustive audit, necessitated by the discovery that a trusted but dishonest bookkeeper had for several years failed to charge certain cus-

tomers for the electricity actually used by them. This isolated instance should not discredit municipal plants as a group any more than the essentially fraudulent

transactions of the managers of a single private company should discredit the management of other private utilities in the state.

That the average for private companies is not distorted by the effect of a few large generating companies is indicated by the following tabulation which includes only establishments selling less than 8,000,000 kw. hrs. in 1929.

	Private Companies	Municipal Plants
Number of establish- ments.....	32	38
Kw. hrs. sold.....	65,559,000	64,414,000
Number of custom- ers.....	66,639	70,840
Commercial and general expense..	\$561,473	\$381,640
Cost per customer..	\$8.43	\$5.39

The larger part of the variation is presumably not in the clerical expense where the private companies, with methods carefully standardized by experts, should have the advantage, but in the compensation of management. If the cost of management could be separated from the other expenses combined with it in Table XII, it would probably reveal that management costs per customer are two or three times as much for some companies as for others and that the average, per-customer management cost of private companies is at least twice that of municipal plants.

Depreciation

Some of the companies, with a complete disregard of well-established principles of accounting, treat the annual charge for depreciation as a debit to surplus rather than as an operating ex-

pense. If such companies distribute both electricity and gas, there is no division of the depreciation charge between the two. Generating establishments naturally have higher depreciation charges than purchasing companies, the extent depending upon the proportion of electricity generated to electricity purchased. Table XIII therefore lists only those companies which purchase all electricity distributed and which do not also distribute gas.

Depreciation expense can most logically be compared as a percentage of the cost of depreciable assets. In the case of non-generating companies, depreciable assets consist almost exclusively of transmission and distribution equipment and since the companies with a heavy investment in underground construction are almost all generating companies, the establishments listed have equipment of essentially comparable life. Until 1921 Massachusetts companies deducted the annual depreciation directly from the asset account instead of maintaining the asset accounts at cost and having a separate credit account in which to accumulate the depreciation to date. Consequently, the present balance sheets do not reveal the cost of the physical property.

In default of this information, Table XIII shows depreciation expense as a percentage of gross revenue from the sale of electricity. The private companies show great diversity both in the amounts for companies of similar size and in the percentages of revenue. The municipal plants are required by law to make annually a cash payment to a depreciation fund amounting to not less than 3% of the cost of the plant exclusive of land and any water power appurtenant thereto.¹¹ The depreciation fund

¹¹ Section 57 of Chapter 164 of the General Laws, Lincoln, *op. cit.*, p. 43, says depreciation was reckoned at 5% as part of the cost of producing current from 1891 to 1905. (Mass. Laws 1891, c. 370, sec. 10). In 1905

by Mass. Acts, c. 410, sec. 4 the amount was to be reckoned at 5% of total cost of plant which was to be included in annual expenses; in 1906 this was amended to 3% by c. 411.

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 TABLE XIII. DEPRECIATION EXPENSE, 1929.

Number	PRIVATE COMPANIES			MUNICIPAL PLANTS	
	City	Amount Reported	Cost Per Dollar of Revenue (Cents)	Cost Per Dollar of Revenue (Cents)	Amount Reported
17	Worcester Suburban.....	\$105,338	12.1		
20	Quincy.....	85,077	8.0		
21	Southeastern.....	31,195	6.7		
22	Abington and Rockland.....	45,000	6.9		
23	Union.....	53,149	9.8		
26				5.6	\$24,064
30	Gardner.....	20,000	4.3		Chicopee
31	Attleboro.....	41,400	9.4		
33	Northampton.....	22,030	5.2		
34	Leominster.....	27,890	7.5		
42	Plymouth.....	51,667	12.3		
43	Marlboro.....	50,657	11.0		
44	Amesbury.....	26,569	7.8		
45	Milford.....	17,702	6.8		
46				5.8	Norwood
50				4.4	Belmont
51				7.5	Wellesley
53				8.4	Danvers
54				4.3	Mansfield
55				6.2	North Attleboro
56	Middlesex.....	3,577	3.2		
63				9.0	Hull
66	Ware.....	14,993	11.0		
67	Seekonk.....	7,500	8.6		
68				5.9	Hingham
69	Ayer.....	4,829	6.5		
70	Lee.....	15,000	17.9		
72				6.4	South Hadley
73				5.3	Shrewsbury
74	Randolph and Holbrook.....	19,012	14.7		
76	Norton.....	6,139	10.1		
78	Manchester.....	5,972	7.1		
79	Ludlow.....	5,000	7.9		
80				10.1	Groton
81	Agawam.....	10,000	14.7		
83				5.6	Merrimac
85				7.5	Holden
86	Mill River.....	1,873	7.4		
88				6.3	West Boylston
89				6.7	Georgetown
90				7.0	Littleton
91				9.8	Templeton
92				5.1	Chester
93				4.8	Ashburnham
94				9.0	Sterling
95	Charlemont.....	1,195	9.0		
96				6.5	Groveland
97				9.6	Southwick
98				11.3	Rowley
99				5.0	Middleton
100	Harvard.....	2,058	11.8		
101	Hampshire.....				
102				10.4	Boylston
104				13.1	Princeton
105				9.8	Paxton
106				7.8	Russell
107				8.8	Blandford
108	Leverett.....				
109				8.0	Granville
110	New Salem.....	800	46.0		
111	Western Mass., Hancock.....	39	4.6		
	Total.....	\$673,761	8.70	6.40	\$144,999

may be expended for renewals in excess of ordinary repairs, extensions, reconstruction, enlargements and additions, or for the payment of indebtedness incurred for reconstruction or renewals in excess of ordinary repairs. As a result of the foregoing provision, municipal plants have a more uniform policy in the matter, and the differences in the percentages of revenue more nearly reflect differences in average revenue per kw. hr. and in plant investment per kw. hr.

An examination of the table shows that in general municipal plants are making smaller charges to depreciation expense than private companies. The average for municipal plants is only 6.4% as against 8.7% of revenue for private companies. The average depreciation expense per kw. hr. is in about the same ratio, or 0.28 cents as against 0.36 cents for the private companies. A change in the law which would require municipal plants to make the annual charge for depreciation 4% instead of 3% would put them on the same basis as the present average practice of private companies. The amount involved would not be large enough to require any increase in rates and would provide a larger factor of safety against both wear and tear and obsolescence.

As will be shown in a later table (Table XV), the Middlesex County Electric Company, which has the lowest ratio of depreciation to revenue of any company, paid no dividends in 1929. This fact doubtless accounts for the reluctance of the directors to charge off adequate depreciation. On the other hand, the Lee Electric Company, with the lowest ratio of dividends and interest paid to revenue of any of the moderate sized companies, has the highest ratio of depreciation expense to gross revenue of any of the purchasing companies which are listed in Table XIII.

That the net book values of the Massachusetts municipal plants are not excessive is evidenced by the desire of private companies to buy out some of the municipal plants at figures considerably higher than the recorded costs. It is probable, however, that in this State the offered premiums are attributable in large measure to a desire to eliminate an actual or potential example of low domestic rates. The latter motive could not have been active in the case of the sale last November of the little Granville municipal plant to the Lee Electric Company. The total book value of the assets of this plant was only \$12,630 on December 31, 1929. The net proceeds of the sale, after liquidating all indebtedness, plus operating profits, resulted in a payment to the town treasury of over \$6,000—not a bad showing for a plant only five years old. Fortunately, such sales of municipal plants require approval by the Public Utility Commission, and the policy of the Commission is to disapprove proposed sales at excessive prices, on which dividends must later be earned.

Operating Ratio

A low operating ratio or ratio of operating expenses to gross revenue is frequently referred to as an indication of good management and it is true that the lower the operating ratio the larger the proportion of gross revenue available for dividends and interest. On the other hand, a low operating ratio may be attributable not to low operating expense but to large revenue. In other words, a low operating ratio may mean an excessive investment in plant and high rates for electricity, and a high operating ratio may mean a minimum investment in plant and low rates for electricity. In the case of a municipal plant a very high operating ratio may not indicate low

efficiency but simply that rates have probably been already reduced as low as safety will permit. A low operating ratio conversely may indicate that the customers are probably entitled to lower rates than they are getting. It must therefore be clear that operating ratios do not provide a suitable basis for comparing the efficiency of private companies and municipal plants and they have accordingly not been tabulated.

Taxes

If the companies were allowed to charge all the traffic would bear, they might be considered particularly appropriate objects of taxation. If they were actually on a service-at-cost basis, it can be argued with much force that they should be exempt from taxation, since in that case they would be simply an agency for tax collection, and there is no obvious reason why the public should be taxed on the basis of the amount of electricity used. Such considerations are beside the present point. The fact remains that the companies are taxed and municipal plants are not. Table XIV shows the taxes for 1929. For the companies selling only electricity these are the total taxes. The companies selling both electricity and gas are required in their annual reports to the Commission to allocate their taxes between the two. For such companies the amount shown in Table XIV is the amount assigned by the company to electricity in its report.

Since generating companies require a larger investment in proportion to the k.w hrs. sold than companies purchasing all electricity distributed, it might be expected that they would have heavier taxes. In Table XIV the companies have been separated into two groups, the first including all companies generating any electricity. The relative investment

(and hence the relative tax burden) is affected not only by variations in the percentage of electricity generated; it is affected also by the character of the load, whether concentrated or scattered, whether all the year round or highly seasonal. The profitableness of the company determines the Federal income tax and is a factor in determining the amount of the State excise tax. In addition the local tax rates on physical property of the various cities and towns vary appreciably. All things considered, the percentage of taxes to revenue from the sale of electricity seems to be the most significant basis of comparison and it is much more uniform than the taxes per kw. hr. The average for all generating companies is 12.6% and for purchasing companies 9.1%. The net result of all the variable factors mentioned above is a range in the percentage for the larger purchasing companies from 5.4 for Southeastern to 14.6 for Attleboro.

The Holyoke municipal plant pays taxes to the City on some formerly taxable real estate which it has acquired comparatively recently, but not on the balance of its real estate and equipment. The Norwood municipal plant pays over to the town treasurer each year an amount equal to the taxes which a private company having the same plant investment in Norwood would otherwise pay. While many of the municipal plants make contributions to the town treasury from time to time, Norwood is the only town which puts the contribution on an exact tax equivalent basis.

Dividends and Interest Paid

The item of cost in which the inherent divergence between private companies and municipal plants is widest is "Wages of Capital." This includes both interest and dividends for the former and interest only for the latter.

TABLE XIV. TAXES ASSIGNABLE TO ELECTRIC OPERATIONS, 1929.

Number	GENERATING COMPANIES			PURCHASING COMPANIES			Taxes Per Dollar of Revenue (Cts.)
	City	Amount Taxes	Taxes Per Dollar of Revenue (Cts.)	Number	City	Amount Taxes	
1	Boston Edison.....	\$4,035,718	13.7	17	Worcester Suburban.....	\$71,123	8.2
2	New Bedford.....(Gas)	454,883	12.8	20	Quincy.....	101,796	9.5
3	United Springfield.....	451,832	11.9	21	Southeastern.....	24,981	5.4
4	Salem.....	185,387	10.1	22	Abington and Rockland.....	42,712	6.5
5	Worcester.....	424,033	11.5	23	Union, Franklin.....	59,974	11.1
6	Fall River.....	276,954	11.1	25	North Adams.....(Gas)	48,595	9.4
7	Cambridge.....	297,060	12.1	27	Charlestown.....(Gas)	50,586	10.5
8	Brockton.....	286,943	13.5	30	Gardner.....	33,113	7.1
9	Malden.....	343,448	11.5	31	Attleboro.....	64,499	14.6
10	Lynn.....(Gas)	289,624	13.6	33	Northampton.....	39,026	9.2
11	Lowell.....	319,934	16.5	34	Leominster.....	37,517	10.0
12	Pittsfield.....	92,796	7.2	42	Plymouth.....	41,316	9.9
13	Lawrence.....(Gas)	205,011	12.0	43	Marlboro.....	48,280	10.5
14	Haverhill.....(Gas)	186,954	13.4	44	Amesbury.....	30,131	8.8
15	Fitchburg.....(Gas)	130,938	13.1	45	Milford.....	22,244	8.5
18	Central Mass., Palmer.....	65,785	9.0	48	Clinton.....(Gas)	23,255	9.8
19	Greenfield.....	88,332	11.7	56	Middlesex.....	6,341	5.6
24	Weymouth.....	36,191	6.2	57	Spencer.....(Gas)	10,689	8.5
29	Webster & Southbridge (Gas)	46,997	8.8	58	Adams.....(Gas)	13,961	8.3
35	Southern Berkshire.....	45,519	11.5	61	Easthampton.....(Gas)	8,309	6.6
36	Suburban, Revere	75,789	11.0	62	Amherst.....(Gas)	17,067	9.3
38	Gloucester.....	58,702	10.8	66	Ware.....	13,067	10.2
39	Beverly.....(Gas)	65,211	12.0	67	Seekonk.....	7,026	8.1
40	Cape and Vineyard.....	62,496	7.6	69	Ayer.....	5,875	7.9
41	Athol.....	28,694	7.3	70	Lee.....	5,369	6.4
64	Winchendon.....	16,569	15.1	74	Randolph and Holbrook.....	14,223	11.0
82	Citizens, Nantucket.....	5,408	5.0	75	Williamstown.....(Gas)	6,783	7.5
87	Provincetown.....	3,428	6.0	76	Norton.....	3,121	6.2
103	Huntington.....	792	5.2	78	Manchester.....	9,773	11.7
	Total.....	\$8,581,428	12.6	79	Ludlow.....	4,250	6.7
				81	Agawam.....	5,064	7.4
				84	Blackstone.....(Gas)	4,938	7.9
				86	Mill River.....	2,851	11.3
				95	Charlemont.....	316	2.4
				100	Harvard.....	2,246	12.9
				101	Hampshire.....	1,019	8.9
				108	Leverett.....	220	6.7
				110	New Salem.....	164	9.4
				111	Western Mass., Hancock	74	8.7
				Total.....	\$881,894	9.1	

It has been argued that in any comparison of private and public electrical enterprises, interest on the entire capital employed should be figured in both cases. From a purely academic standpoint there is something to be said in favor of this. From the practical standpoint, however, the pertinent question is how many dollars must be transferred from the consumer's pocket to the pocket

of the man who has supplied capital funds. There is no reason why the consumer of the municipal plant should pay or be charged any interest on that portion of its capital which he or other consumers have contributed in prior years through rates in excess of actual cost. On the other hand, it would be entirely appropriate to require the municipal electric departments to pay interest to

the town on all advances from the tax levy, requiring also, of course, that all contributions from the electric department to the town be credited against such advances.

The figures for the private companies and for the municipal plants are so different that no advantage is to be gained by showing them in parallel columns in a single table. Since the capital employed is greater for generating companies than for companies distributing only and since it is impossible to allocate the total wages of capital satisfactorily between the gas and electric ends of joint enterprises, Table XV contains only those non-generating, private companies which distribute electricity but not gas.

Massachusetts utilities have been financed to a much greater extent through stocks and to a much lesser extent through bonds than have companies in other states. During 1929, 13 of the 30 companies had such large cash balances at interest that their interest received exceeded the interest paid. Except for a few of the smallest companies, the dividends paid greatly exceed the interest item. In Table XV the net amount only is shown, the net interest received being in the case of the 13 companies deducted from the dividends paid.

Net additions to surplus might from one point of view be properly included with dividends and interest as part of the return to capital. On the other hand,

TABLE XV. WAGES OF CAPITAL FOR PRIVATE COMPANIES DISTRIBUTING ELECTRICITY ONLY, 1929.

Number	City	Dividends Paid	Interest Paid and Amortization of Discount	Interest and Dividends Received	Net Total Interest and Dividends	Total Per Dollar of Revenue (Cents)
17	Worcester Suburban.....	\$144,266	\$12,866	\$11,604	\$145,528	10.8
20	Quincy.....	179,004	24,647	5,652	197,999	18.6
21	Southeastern.....	58,642	2,801	2,019	59,424	12.8
22	Abington and Rockland.....	56,700	12,187	681	68,206	10.4
23	Union.....	88,902	2,559	12,105	79,356	14.6
30	Gardner.....	59,265	12,416	860	70,821	15.1
31	Attleboro.....	79,872*	278	23,391	56,759	12.8
33	Northampton.....	58,700	17,449	4,111	72,038	16.9
34	Leominster.....	63,550	1,862	3,665	61,747	16.5
42	Plymouth.....	75,000	465	3,027	72,438	17.3
43	Marlboro.....	78,754	6,235	7,943	77,046	16.7
44	Amesbury.....	56,924	1,348	3,392	54,880	16.1
45	Milford.....	31,800	16,015	1,706	46,109	17.7
56	Middlesex.....	.....	18,382	262	18,120	16.0
66	Ware.....	21,024	1,400	2,908	19,516	15.2
67	Seekonk.....	20,104*	1,448	3,139	18,413	21.2
69	Ayer.....	11,700	104	2,258	9,546	12.8
70	Lee.....	3,600	1,818	877	4,541	5.4
74	Randolph and Holbrook.....	26,775	3,751	774	29,752	23.0
76	Norton.....	7,950	795	1,234	7,501	14.8
78	Manchester.....	30,870	393	2,948	28,315	33.8
79	Ludlow.....	7,500	899	144	8,255	13.0
81	Agawam.....	8,000	1,307	167	9,140	13.4
86	Mill River.....	5,250	111	339	5,022	19.9
95	Charlemont.....	300	.....	.....	300	2.3
100	Harvard.....	3,600	99	128	3,571	20.4
101	Hampshire.....	.....	119	41	78	0.7
108	Leverett.....	504	61	9	556	17.0
110	New Salem.....	.....	207	.....	207	11.9
111	Western Mass., Hancock.....	.....	217	10	207	24.4
	Total.....	\$1,178,546	\$142,239	\$95,394	\$1,225,391	15.8

**"Extra" dividend not included.

a factor of safety in rates which results normally in some addition to surplus is desirable for both private companies and municipal plants. On the whole, it is probably more illuminating to confine the table to amounts actually paid (and received). The totals for the purchasing companies are as follows:

Dividends paid.....	\$1,178,546
Interest paid (including discount).....	142,239
	<hr/>
	\$1,320,785
Less interest and dividends received.....	95,394
	<hr/>
Net total dividends and interest.....	\$1,225,391

Since the investment in distributing plant is appreciably higher per kw. hr. sold to the small consumer than the investment per kw. hr. sold to the large user, interest and dividends, which are the return on the investment, should be allocated at a higher rate to the domestic kw. hr. than to the commercial or power kw. hr. Consequently, in Table XV the net total of interest and dividends for each company is shown as a percentage of its gross revenue and the weighted average for all companies is 15.8% of revenue. The high degree of uniformity in the figures is in itself an indication that this is a proper basis for comparison.

The exceptionally high percentage of the Manchester Electric Company is caused by the fact that Manchester is an aristocratic summer resort and that a very large proportion of the entire distribution system is underground. The correspondingly heavier investment than normal necessitates larger payments for the use of capital.

Sources of Capital, Municipal Plants

It is difficult to make a direct comparison of the cost of capital to private companies and to municipal plants, be-

cause so large a proportion of the assets of the latter have been paid for from surplus earnings reinvested in the property. Table XVI shows the sources of capital of municipal plants as reported to the Commission.

Fourteen municipal plants have completely paid off their bond and note issues but still report some "unrepaid appropriations for construction." Ten other plants have repaid all appropriations for construction but still have bonds or notes outstanding. Two plants, Norwood and Hull, have paid off both funded debt and appropriations for construction and have outstanding only current and accrued liabilities for such items as electricity purchased in December, supplies, etc. The number of plants having no funded indebtedness will increase, because all bonds issued since 1913 are serial bonds and a certain portion must be paid off each year. In most instances additional bond issues will not be necessary, since extensions can usually be financed either from the depreciation fund or from surplus earnings.

It may be well to emphasize that every municipal plant in Massachusetts showed in 1929 a balance of net income to be transferred to the profit and loss account. The totals for all municipal plants for that year, including the four gas plants, were as follows:

Operating revenue.....	\$6,241,835
Operating expenses.....	4,939,368
	<hr/>
Net operating revenue.....	\$1,302,467
Less:	
Uncollectible revenue \$20,210	
Taxes	36,285
	<hr/>
Net.....	56,495
Add: Non-operating revenue (interest, etc.).....	<hr/> 34,475
	<hr/>
Gross income.....	\$1,280,447
Less: Deductions (interest paid, etc.).....	136,988

Income balance to profit and loss..... \$1,143,459
 Less: Note, bond, and sinking fund requirements..... 330,359

Available for repayment of appropriations and for extensions... \$ 813,100

The totals as of December 31, 1929, from Table XVI for all municipal plants, including in four cases the capital invested in gas plant as well as electric plant, are as follows:

Bonds and notes payable outstanding... \$3,077,100 19.4%
 Less sinking fund assets..... 329,397 2.1

Net outstanding.... \$2,747,703 17.3

Current and accrued liabilities..... 391,879 2.5%

Unrepaid appropriations for construction..... 741,049 4.7

Net debt (including amount due municipality)..... \$3,880,631 24.5

Total surplus invested in plant..... 12,021,311 75.5

Total book value assets (less sinking fund). \$15,901,942 100.0%

Two sources of errors in these figures make it unsafe to accept them at 100% of their face value. These errors are fortunately in opposite directions and

TABLE XVI. SOURCES OF CAPITAL, MUNICIPAL PLANTS, DECEMBER 31, 1929.

Number	City	Started or Acquired	Bonds and Notes Payable Outstanding	Sinking Fund Assets	Bonds and Notes Payable Less Sinking Fund	Current and Accrued Liabilities	Unrepaid Appropriations for Construction as Reported	Total Surplus Invested in Plant as Reported	Total Book Value Assets (Less Sinking Fund Assets)	Percentage Surplus to Total Book Value Assets
16	Holyoke.....(Gas)	1902	\$1,425,000	.....	\$1,425,000	\$ 69,070	.....	\$ 2,706,496	\$ 4,200,566	65%
26	Chicopee.....	1806	59,750	.....	59,750	46,900	\$42,934	766,888	916,562	83
28	Taunton.....	1897	776,000	\$189,321	586,679	27,626	.....	1,330,312	1,944,617	58
32	Westfield.....(Gas)	1809	55,000	.....	55,000	23,765	46,441	771,669	896,875	86
37	Braintree.....	1892	.....	.....	.....	57,362	46,109	469,170	572,701	82
46	Norwood.....	1907	12,000	.....	12,000	15,753	.....	383,712	399,465	96
47	Peabody.....	1892	67,300	.....	67,300	17,774	85,498	172,315	287,587	60
49	Reading.....	1895	18,000	.....	18,000	35,301	30,678	388,994	522,273	74
50	Belmont.....	1898	.....	.....	.....	823	37,414	381,371	437,608	87
51	Wellesley.....	1906	.....	.....	.....	6,849	28,569	507,587	543,005	93
52	Wakefield.....(Gas)	1894	149,500	.....	149,500	25,478	51,033	532,044	738,655	70
53	Danvers.....	1889	12,800	6,735	6,065	3,370	.....	250,165	259,600	96
54	Mansfield.....	1904	61,500	46,766	14,734	8,350	10,539	138,782	172,605	80
55	North Attleboro.....	1894	.....	.....	.....	192	8,409	253,476	262,077	97
59	Hudson.....	1897	67,000	.....	67,000	7,134	20,093	373,207	467,434	78
60	Concord.....	1900	142,000	86,375	55,425	8,384	.....	206,653	270,463	76
63	Hull.....	1894	.....	.....	.....	4,808	.....	326,633	331,461	98
65	Marblehead.....	1895	7,000	.....	7,000	140	.....	339,491	346,631	98
68	Hingham.....	1895	.....	.....	.....	2,886	64,209	136,329	203,424	57
71	Middleboro.....(Gas)	1893	30,000	.....	30,000	1,777	45,993	372,061	450,431	83
72	South Hadley.....	1914	12,000	.....	12,000	620	.....	194,200	266,820	94
73	Shrewsbury.....	1908	.....	.....	.....	14,309	29,569	127,846	171,724	74
77	Ipswich.....	1903	50,750	.....	50,750	548	1,511	171,429	224,238	76
80	Groton.....	1909	.....	.....	.....	1,224	44,595	75,538	121,347	62
83	Merrimac.....	1904	.....	.....	.....	1,681	6,475	79,820	87,976	91
85	Holden.....	1912	.....	.....	.....	.....	24,324	60,652	84,976	71
88	West Boylston.....	1911	.....	.....	.....	.....	20,006	49,230	69,236	71
89	Georgetown.....	1912	3,000	.....	3,000	300	15,796	50,396	69,552	72
90	Littleton.....	1912	6,000	.....	6,000	650	1,767	51,242	59,659	86
91	Templeton.....	1907	.....	.....	.....	.....	21,544	57,399	78,943	73
92	Chester.....	1926	54,500	.....	54,500	967	.....	14,972	70,439	21
93	Ashburnham.....	1908	.....	.....	.....	912	6,450	28,788	36,150	80
94	Sterling.....	1911	.....	.....	.....	.....	10,650	50,169	60,819	82
96	Groveland.....	1907	3,000	.....	3,000	1,118	5,734	33,197	43,049	77
97	Southwick.....	1920	28,600	.....	28,600	613	.....	37,670	66,883	56
98	Rowley.....	1910	4,400	.....	4,400	872	11,770	33,090	50,132	66
99	Middleton.....	1913	.....	.....	.....	693	8,866	14,299	23,858	60
102	Boylston.....	1912	.....	.....	.....	447	3,819	26,239	30,525	86
104	Princeton.....	1912	4,000	.....	4,000	15	1,681	27,988	33,684	83
105	Paxton.....	1914	2,700	.....	2,700	2,484	6,390	14,153	25,727	55
106	Russell.....	1920	5,500	.....	5,500	74	1,523	7,117	14,214	50
107	Blandford.....	1925	9,600	.....	9,600	192	.....	5,529	15,321	36
109	Granville.....	1926	10,200	.....	10,200	67	.....	2,363	12,630	19
	Total.....		\$3,077,100	\$329,397	\$2,747,703	\$391,879	\$741,049	\$12,021,311	\$15,901,942	76%

tend to cancel each other so that the resulting corrected figures would probably not be very different from those given. In the first place, the reports list "Unrepaid appropriations for construction" but make no reference to possible "Unrepaid appropriations for operating expenses" in the earlier years of the plants. These may in some instances have taken the form of excessive allowances to the electric department for street lighting. On the other hand, some of the towns are using the electric departments as sources of revenue to relieve the taxpayers and are not crediting amounts paid into the town treasury from electric revenues against the construction appropriations previously charged.

The Belmont municipal plant, for example, carries on its balance sheet \$37,414 as "Unrepaid appropriations for construction." During the five years, 1926 to 1930 inclusive, the municipal plant has paid over to the town treasury over \$38,000, more than enough to cancel the debt, but not one cent of this has been credited by the town against the appropriations for construction. Such a procedure is not only poor accounting but grossly unfair to the municipal plant.

A flagrant case is that of Peabody, which shows an unpaid balance on the appropriation account of \$85,498. During the last few years the municipal plant has paid over to the town as a gift the following amounts, none of which have been applied to the reduction of the unpaid balance on the appropriations account.

1927.....	\$18,726.06
1928.....	32,313.71
1929.....	49,578.15
1930.....	75,730.18

This is not only unfair to the municipal plant but unfair to the consumers, who are reasonably entitled to a further

reduction in rates. The 1930 gift to the town was almost 25% of the gross revenue for the year. There could not be a more favorable time to introduce a modern combination rate.

In a somewhat different category is the case of the Taunton municipal plant, which had a net bonded indebtedness of \$586,679 outstanding at the end of 1929. During that year it paid back to the city the total previous appropriations for construction, amounting to \$20,173.20, and also paid over to the city treasury \$150,000 of surplus earnings. To give a correct picture of the financial success of this municipal lighting plant, the \$150,000 should have been applied to the reduction of the bonded indebtedness of the plant. In 1930 the plant made another gift to the city of \$46,000, in addition to retiring \$50,000 of bonds and adding \$9,550.86 to the sinking fund.

It seems fair to say that a tendency to milk the municipal plants for the benefit of the tax rate is much more in evidence than a tendency to subsidize them at the expense of the taxpayer. That the consumers of municipal plants should be charged rates which will gradually retire the indebtedness incurred for construction is desirable. This having been done, the consumers should benefit through reduced rates to the extent of the interest charges eliminated.

Interest Paid by Municipal Plants

Table XVII shows the interest paid and received by municipal plants. Since so large a proportion of the total assets (75.5%) has been paid for out of surplus earnings, the net interest expense is small as compared with the dividends and interest paid by private companies.

The totals for all municipal plants, including both generating and purchasing plants and the four plants which are also distributing gas, are as follows:

	<i>Amount</i>
Interest paid.....	\$133,557
Interest received.....	32,933
Net interest paid.....	\$100,624
Add theoretical interest on "unrepaid appropriations" at 4%.....	29,642
Net total.....	\$130,266

Even including the theoretical interest on "unrepaid appropriations for construction," the net total amounts to only 2.4% of gross revenue from electricity.

If Holyoke and Taunton, the two largest municipal generating plants, are omitted, the figures are as follows (p. 429):

TABLE XVII. INTEREST PAID BY MUNICIPAL PLANTS, 1929.

Number	City	Interest Paid	Interest Received	Net Interest Paid	Net Interest Received	Net Interest Paid Per Dollar Revenue (Cents)
16	Holyoke.....(Gas).....	\$58,925	\$6,699	\$52,226	.....	7.3
26	Chicopee.....	3,024	1,950	1,074	.....	.3
28	Taunton.....	33,796	7,622	26,174	.....	4.4
32	Westfield.....(Gas).....	2,612	.....	2,612	.....	.8
37	Braintree.....	200	1,601	.....	\$1,401	.....
46	Norwood.....	188	.....	188	.....	.1
47	Peabody.....	513	590	.....	77	.....
49	Reading.....	3,441	.....	3,441	.....	1.4
50	Belmont.....	745	.....	745	.....	.4
51	Wellesley.....	.....	.....	.....	.....	.....
52	Wakefield.....(Gas).....	6,406	620	5,786	.....	3.1
53	Danvers.....	656	1,245	.....	589	.....
54	Mansfield.....	2,520	2,871	.....	351	.....
55	North Attleboro.....	.....	.....	.....	.....	.....
59	Hudson.....	3,150	838	2,312	.....	1.7
60	Concord.....	6,923	5,236	1,687	.....	1.2
63	Hull.....	105	367	.....	262	.....
65	Marblehead.....	280	489	.....	209	.....
68	Hingham.....	.....	.....	.....	.....	.....
71	Middleboro.....(Gas).....	1,317	.....	1,317	.....	1.1
72	South Hadley.....	520	.....	520	.....	.8
73	Shrewsbury.....	8	.....	8	.....	.....
77	Ipswich.....	2,375	.....	2,375	.....	3.2
80	Groton.....	.....	664	.....	664	.....
83	Merrimac.....	.....	767	.....	767	.....
85	Holden.....	.....	319	.....	319	.....
88	West Boylston.....	.....	.....	.....	.....	.....
89	Georgetown.....	147	.....	147	.....	.5
90	Littleton.....	255	579	.....	324	.....
91	Templeton.....	160	237	.....	77	.....
92	Chester.....	1,984	65	1,919	.....	9.5
93	Ashburnham.....	.....	.....	.....	.....	.....
94	Sterling.....	.....	.....	.....	.....	.....
96	Groveland.....	169	.....	169	.....	.9
97	Southwick.....	1,502	.....	1,502	.....	7.6
98	Rowley.....	182	69	113	.....	7.1
99	Middleton.....	.....	.....	.....	.....	.....
102	Boylston.....	.....	22	.....	22	.....
104	Princeton.....	214	37	177	.....	1.8
105	Paxton.....	70	46	24	.....	.3
106	Russell.....	295	.....	295	.....	5.5
107	Blandford.....	396	.....	396	.....	8.6
109	Granville.....	479	.....	479	.....	10.5
	Total.....	\$133,557	\$32,933	\$105,686	\$5,062	.....

	<i>Amount</i>
Interest paid.....	\$40,836
Interest received.....	18,612
Net interest paid.....	\$22,224
Add theoretical interest on "un-repaid appropriations".....	29,642
Net total.....	\$51,866

The latter figure, including the smaller generating plants and three gas plants, amounts to only 1.24% of gross electric revenue as against an average of 15.8% for dividends and interest paid by the non-generating private companies. This large difference of approximately 14.5% of gross revenue in favor of the municipal plants is attributable in part to the lower interest rates paid by municipal plants as compared with the rates paid for capital, both owned and borrowed, by private companies. Much more important is the fact that extensions to municipal plants financed out of earnings involve no interest expense and that earnings applied to debt reduction permanently reduce interest expense. The private companies, on the other hand, never reduce interest-bearing indebtedness except by the issue of stock, involving usually larger annual charges, and normally compensate their stockholders through increased dividend rates for all earnings retained and invested in the business.

New legislation might well be enacted which would require (a) that the municipal plants pay interest, at say 4%, to the city or town on all "unrepaid appropriations for construction"; (b) that all payments by a municipal plant to a city or town, other than for services rendered, should be credited against unrepaid appropriations from the city or town, if any; (c) that adjustments be made on both the municipal plant and city or town records to credit any amounts heretofore paid by the plants against

"unrepaid appropriations from construction," unless such payments have already been so credited. The requirement as to interest is necessary if the municipal plants are to stand on their own feet. If they are to pay interest to the cities and towns on amounts advanced, it is only fair that all amounts repaid should be properly credited. The records should reveal, not conceal, the true situation.

Domestic Rates

No average figures are more misleading and grossly unreliable than those for average revenue per kw. hr. when used as a basis for comparing electric rates. This fact is most lucidly demonstrated by Mosher.¹² The fairest way to compare the cost of electricity to any class of consumers is to determine the actual price paid for a definite, normal number of kw. hrs. per month. The variations in the demands, load factors, and consumption of electricity between different commercial and industrial users make it impossible to set up any "representative customer" sufficiently typical of these groups. Furthermore, some of the companies of which the Boston Edison is one, have a number of different rate-schedules for large users. Which particular rate-schedule applies depends on the purpose for which electricity is used. Two customers, having identical demands, identical load factors, identical consumption, identical power factors, may receive from the same company bills of appreciably different amounts. The limits of this article preclude an adequate analysis of commercial and industrial rates. The discussion here will be confined to domestic rates which are those of greatest interest to the large majority of consumers.

¹² *Public Utilities: The Crisis in Public Control* (New York: Harper and Brothers, 1929), p. 237 *et seq.*

Since average prices are wholly unsatisfactory for the purpose, it becomes necessary to set up a normal or representative consumer as a basis for comparison. The National Electric Light Association has stated that the average domestic consumption for 1929 was approximately 500 kw. hrs. or slightly over 40 kw. hrs. per month. For convenience in figuring, an even 40 kw. hrs. has been taken as the basis for the costs shown in Table XVIII and Chart III.

Many of the establishments, both private and municipal, offer a cash discount for prompt payment, of which most customers avail themselves. The figures shown are the net cost after deducting the prompt payment discount.

Many of the companies offer a room or area rate. In each case the minimum number of rooms or the minimum area prescribed by the company has been used unless the minimum was less than five rooms or 1000 sq. ft. In such cases, few in number, the latter figures have been used instead of the prescribed minimum. The use of the minimum weights the figures unduly in favor of the companies, as many of their customers having more than the minimum number of rooms or more than the minimum square feet will pay more than the tabulated amount.

A number of the companies serving more than one town make a higher rate for the outlying or more sparsely settled district. In the tabulation the lowest rate offered has been used. There are, therefore, a considerable number of towns served by private companies and a few served by municipal plants where the rates paid are actually 20 or 40 cents higher than the table indicates.

Local taxes, if not paid by the utility, come back on the population of the district who are the customers of the utility. A fair comparison of rates must therefore either add to the municipal rates the

equivalent of the taxes a private company owning the municipal plant would pay or deduct from the rates of the private company the taxes which it actually does pay to the municipality. Federal corporation income taxes paid by the private utility companies are in a different category, and so to some extent are the taxes paid to the Commonwealth of Massachusetts. If such taxes were not paid by the utility companies, assuming the shortage to be made up by higher income tax rates, it is questionable how much of the shortage would come back on the average utility customer in the small town and how much would land on the backs of a few wealthy individuals in New York and other large centers.

In order to be entirely fair to the private companies, the taxes deducted in the table are the pro-rata portion of all taxes paid, including the Federal corporation income tax. The generating companies are further favored, because they are credited with a pro-rata portion of total taxes, whereas they recover a portion of these taxes from the purchasing private companies and purchasing municipal plants. If the generating companies paid no taxes, they could sell electricity more cheaply to the purchasing establishments, and these in turn could sell electricity more cheaply to the consumer. In the table no such compensating reduction is made in the listed rates of the purchasing establishments. The allocation of taxes as a percentage of revenue is itself open to criticism but it appears to be less open to objections than any other practicable method.

In order to show the rate situation as nearly up to date as possible, the rates shown in Table XVIII are those in effect June 1, 1931. Had the 1929 rates been used, the comparison would have been even more favorable to the municipal plants as the private companies have

made many substantial reductions during the past year. The municipal plants, being already on a lower basis, had not the same opportunity to make further reductions. There is a certain inconsistency in the fact that the taxes deducted are the taxes per dollar of revenue in 1929, but the advantage of more recent rates more than compensates for the nominal inconsistency, especially since the tax allocation is an approximation only.

Many of the private companies up to a year or two ago offered the domestic consumer only a flat lighting rate, or a flat lighting rate for everything except cooking which involved a separate meter and separate wiring. Today those same companies offer combination single meter rates of either the room or area type. In a few cases a flat investment charge is substituted for the fluctuating one implied in an area rate. There are not more than half a dozen companies in the State which do not offer the domestic consumer a combination rate for light and heat.

The smallest private company in the State, the Western Massachusetts Electric Company of Hancock, has one of the most intelligent rates. It consists of a flat monthly investment charge of \$1.50 and a commodity charge of four cents per kw. hr. This costs the small consumer, using say 15 kw. hrs. per month, no more than would a flat 15-cent rate which a less enlightened company of this size might adopt. It puts every such small consumer and every larger consumer in a frame of mind which conduces to a liberal use of electric conveniences, and it avoids the vicious circle of high rates, low consumption, and high costs.

It is evident from Table XVIII and Chart III that in general the consumer using 40 kw. hrs. of electricity per

month can obtain it more cheaply if he is served by a municipal plant than he can if served by a private company of equal size. In not a few cases the municipal plants have lower rates than the private companies from which they purchase their supply of electricity. While the table and chart speak for themselves, a few comments may be in order. The lowest rate offered by a private company, Worcester, was put in by order of the Commission after a most bitterly fought rate case which cost the company over \$200,000. In spite of the earlier claim by the company that the rate would be confiscatory, its profits for 1929 were the largest for any year in its history. This indicates that the public cannot rely on enlightened self-interest on the part of the companies to reduce their rates even to the minimum which would result in the largest profit. The next lowest rate, that of Cambridge, is an area rate and was not ordered by the Commission. It was, however, not offered by the company until after a lighting rate of 5½ cents had been put into effect by order of the Commission as a result of another bitterly contested rate case, which was dropped by the company because its profits at the lower rate made it impossible to maintain longer a claim that the new rate was confiscatory.

If a smaller consumption than 40 kw. hrs. per month had been taken as a basis, the comparison would have been superficially more favorable to the municipal plants because a larger proportion of the private companies have a service charge or its equivalent. Since the service charge is unquestionably sound, this is not in any sense a criticism of the private companies.

If a larger consumption than 40 kw. hrs. per month had been used, the differential in favor of the municipal plants would in many cases have been reduced,

TABLE XVIII. NET COST OF 40 KILOWATT HOURS, JUNE 1, 1931.

Number	PRIVATE COMPANIES				MUNICIPAL PLANTS	
	City	Bill for 40 Kw.Hrs. Less Pro- Rata Tax	Pro-Rata Tax 1929 for 40 Kw. Hrs.	Net Bill for 40 Kw. Hrs.	Net Bill for 40 Kw. Hrs.	City
1	Boston Edison	\$2.16	\$0.34	\$2.50		
2	New Bedford.....(Gas)	2.03	0.30	2.33		
3	United, Springfield.....	1.94	0.26	2.20		
4	Salem.....	2.70	0.30	3.00		
5	Worcester.....	1.77	0.23	2.00		
6	Fall River.....	2.44	0.31	2.75		
7	Cambridge.....	1.85	0.25	2.10		
8	Brockton.....	2.16	0.34	2.50		
9	Malden.....	2.33	0.30	2.63		
10	Lynn.....(Gas)	2.06	0.32	2.38		
11	Lowell.....	2.59	0.51	3.10		
12	Pittsfield.....	2.75	0.21	2.96		
13	Lawrence.....(Gas)	2.64	0.36	3.00		
14	Haverhill.....(Gas)	2.94	0.46	3.40		
15	Fitchburg.....(Gas)	3.13	0.47	3.60		
16					\$1.60	
17	Worcester, Suburban.....	2.75	0.25	3.00		Holyoke (Gas)
18	Central Mass., Palmer.....	3.55	0.35	3.90		
19	Greenfield.....	3.00	0.40	3.40		
20	Quincy.....	2.38	0.25	2.63		
21	Southeastern.....	3.59	0.21	3.80		
22	Abington and Rockland.....	2.80	0.20	3.00		
23	Union, Franklin.....	2.67	0.33	3.00		
24	Weymouth.....	3.10	0.20	3.30		
25	North Adams.....(Gas)	2.72	0.28	3.00		
26					2.20	
27	Charlestown.....(Gas)	2.24	0.26	2.50		Chicopee
28					2.70	Taunton
29	Webster and Southbridge ..(Gas)	2.96	0.29	3.25		
30	Gardner.....	3.02	0.23	3.25		
31	Attleboro.....	2.13	0.37	2.50		
32					1.60	Westfield (Gas)
33	Northampton.....	1.91	0.19	2.10		
34	Leominster.....	2.97	0.33	3.30		
35	Southern Berkshire.....	2.83	0.37	3.20		
36	Suburban, Revere.....(Gas)	2.67	0.33	3.00		
37					2.12	Braintree
38	Gloucester.....	3.39	0.41	3.80		
39	Beverly.....(Gas)	2.64	0.36	3.00		
40	Cape and Vineyard.....	4.25	0.35	4.60		
41	Athol.....(Gas)	3.43	0.27	3.70		
42	Plymouth.....	3.15	0.35	3.50		
43	Marlboro.....	3.13	0.37	3.50		
44	Amesbury.....	3.65	0.35	4.00		
45	Milford.....	2.56	0.24	2.80		
46					2.40	Norwood
47					2.52	Peabody
48	Clinton.....(Gas)	3.25	0.35	3.60		
49					2.48	Reading
50					1.80	Belmont
51					2.50	Wellesley
52					2.20	Wakefield (Gas)
53					2.90	Danvers
54					3.20	Mansfield
55					2.40	North Attleboro
56	Middlesex County.....	2.97	0.18	3.15		
57	Spencer.....(Gas)	3.57	0.33	3.90		
58	Adams.....(Gas)	2.75	0.25	3.00		
59					1.80	Hudson
60					3.06	Concord

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TABLE XVIII. (*Continued.*) NET COST OF 40 KILOWATT HOURS, JUNE 1, 1931.

Number	City	PRIVATE COMPANIES			MUNICIPAL PLANTS	
		Bill for 40 Kw. Hrs. Less Pro- Rata Tax	Pro-Rata Tax 1929 for 40 Kw. Hrs.	Net Bill for 40 Kw. Hrs.	Net Bill for 40 Kw. Hrs.	City
61	Easthampton (now part of Amherst.... (Western Counties)	\$3.12	\$.28	\$3.40		
62						
63						
64	Winchendon.....	3.57	0.63	4.20		
65						
66	Ware.....	3.50	0.40	3.90		
67	Seekonk.....	2.85	0.25	3.10		
68						
69	Ayer.....	3.22	0.28	3.50		
70	Lee.....	3.18	0.22	3.40		
71						
72						
73						
74	Randolph and Holbrook.....	3.29	0.41	3.70		
75	Williamstown..... (Gas)	2.77	0.23	3.00		
76	Norton.....	3.85	0.25	4.10		
77						
78	Manchester.....	3.58	0.47	4.05		
79	Ludlow.....	3.17	0.23	3.40		
80						
81	Agawam.....	3.15	0.25	3.40		
82	Citizens, Nantucket..... (Gas)	7.60	0.40	8.00		
83						
84	Blackstone..... (Gas)	4.10	0.35	4.45		
85						
86	Mill River.....	2.57	0.33	2.90		
87	Provincetown.....	5.26	0.34	5.60		
88						
89						
90						
91						
92						
93						
94						
95	Charlemont.....	4.68	0.12	4.80		
96						
97						
98						
99						
100	Harvard.....	3.70	0.55	4.25		
101	Hampshire.....	4.92	0.48	5.40		
102						
103	Huntington.....	3.79	0.21	4.00		
104						
105						
106						
107						
108	Leverett.....			*		
109						
110	New Salem.....	2.94	0.31	3.25		
111	Western Mass., Hancock	2.83	0.27	3.10		

*Absorbed by Western Counties Electric Company.

but because of the smaller number of customers having the larger consumption, the comparison would not have been so indicative of the situation of the

normal domestic consumer.

The most serious criticism of the municipal plants as a group, suggested by the present study, is the failure of so

CHART III

**NET COST TO CONSUMERS OF
40 KILOWATT HOURS PER MONTH**

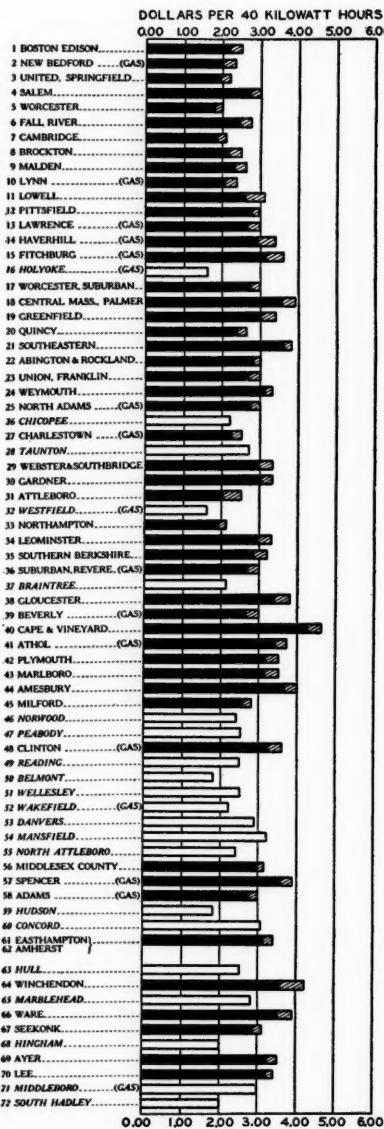
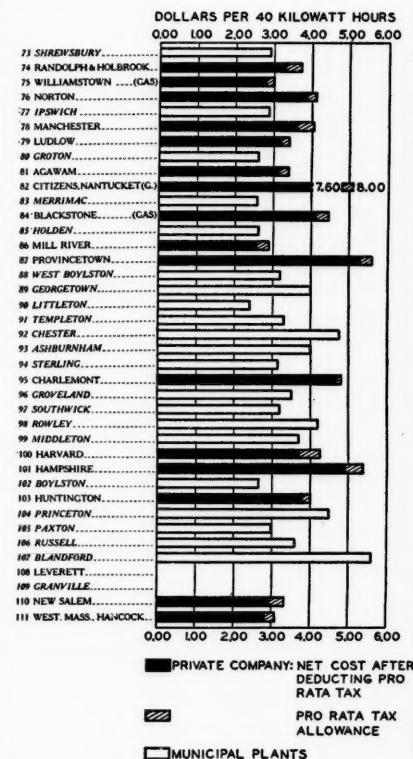


CHART III - CONTINUED



many of them to realize the desirability of a combination domestic rate for light and heat available to all customers. Even though a separate low rate is offered for electricity for cooking and water heating, it involves the use of two meters when one would suffice. The second meter is an economic waste and must be paid for by the customers, either by the customer who uses it or by others. Even in those cases where residential lighting is a large element in the peak load and may plausibly be charged at a higher rate, it is certain that the flatiron, the most used appliance, is an off-peak item and so are most of the other smaller domestic appliances.

To no class in the community does the use of labor-saving appliances mean more than to the woman with a family and little outside help. It is unfair to such people and profits no one else to make all electricity used in appliances bear the maximum rate and so prevent a freer use of appliances. What is needed is a single combination residential rate for electricity regardless of the purpose for which it is used. In addition to a low energy rate per kw. hr. it should include a direct service charge or investment charge, of not less than 50 cents per month, to cover those costs which are independent of the amount of current used and to cover the peak load element of the lighting cost, if any. Somewhat less satisfactory than the service charge is a higher rate for the first 20 or 30 kw. hrs. per month and a low rate on all energy used in excess of the minimum. Such rates will result in an increased use of electricity by present customers with little additional cost to the plant other than the cost of the electricity purchased. Incidentally, the electric range is to a considerable extent on-peak load and a special cooking rate does not in any way encourage an increased use of the minor appliances. The time would seem to be ripe for the introduction of combination rates by the municipal plants which have not already done so. Such action will be much more effective in increasing the use of electricity than further cuts in the maximum rate and will be fairer to the consumers.

Some of the municipal rates, of course, compare favorably in form with those of the private companies. For example, the Reading rate is:

First 25 kw. hrs.—7.2 cents net per kw. hr.
Next 25 kw. hrs.—4.5 cents net per kw. hr.
Next 150 kw. hrs.—2.7 cents net per kw. hr.
Over 200 kw. hrs.—1.8 cents net per kw. hr.

The Hudson plant offers a similar rate:

First 30 kw. hrs.—5.0 cents net per kw. hr.
Next 100 kw. hrs.—3.0 cents net per kw. hr.
Over 130 kw. hrs.—2.0 cents net per kw. hr.

When further reductions become possible, it would be better in both the above cases to reduce or eliminate the present second block rather than to reduce the maximum rate for the first block. Other good municipal rates might be cited.

On the other hand, Norwood, which buys current from the Boston Edison Company and has for years had lower rates than the Edison Company, still requires two meters if the customer wishes a low rate for cooking and forces the user of an electric flatiron or other minor appliance to pay the relatively high lighting rate. Wellesley, which has for years also had a lower rate than the Edison Company, will not permit a customer to sign up for its combination rate unless he proves "a substantial power or heating load." Since the rates of the Boston Edison Company were reduced by order of the Commission last September, a considerable number of customers in each of these two towns could secure their present requirements more cheaply from the Edison Company than from the municipal plants. A more liberal policy in the matter of combination rates would cost these municipal plants almost nothing in net revenue and would place all their domestic customers at an advantage as compared with Edison rates.

An example of a somewhat similar but not identical situation is the rate-schedule of the Belmont municipal plant which has had a very low lighting rate, 4½ cents, reduced to four cents on July 1, 1931. Such a rate means that the very small consumer is not paying the cost of being served and that the larger consumers having only one meter are paying too much. Customers having electric ranges or refrigerators can secure

electricity for their operation, except for the first 10 kw. hrs., at three cents, but only through the economic extravagance of a second meter.

The rate for the first small block should be high enough to cover those costs which are independent of the amount of current consumed. Once these costs have been met, there is no good reason why electricity used in a flatiron should cost more than electricity used in a range.

A few of the companies in Massachusetts still provide "free" incandescent lamps. From a superficial point of view it might seem as if an allowance for free incandescent lamps should be made in a comparison of rates. It must be remembered, however, that "free lamp service" means in practice "large lamps free, small lamps paid for by the consumer." The user of an electric flatiron derives no benefit from the fact that, if she had chosen to consume the same quantity of electricity in large lamps, the company would have provided lamps without charge. What it all amounts to is that the companies collect say an extra half cent per kw. hr., because they offer large lamps free, from customers who use and have to pay for small lamps or who use the electricity in flatirons or other small appliances. The so-called free lamp service involves an appreciable amount of clerical expense for the companies and this is pure economic waste. From the standpoint of the average consumer it would be very much better if the lamp business were put on a "cash-and-carry" or C. O. D. basis and the rates reduced by whatever amount is now figured in for lamps.

It may be argued and conceded that the private companies give more "service" than the municipal plants. If a customer of the Gloucester Electric Company blows a fuse and telephones

the company, a man may be on his way to replace it inside of five minutes. Perhaps the Marblehead municipal plant does not employ men for this purpose. The question remains, how much is it worth per month in dollars and cents to have this super-service? It may be an inadequate basis for a generalization, but the writer never hears complaints as to service from his acquaintances who are customers of municipal plants.

Although averages are, as stated, very likely to be misleading, it is most unfortunate that the Massachusetts Commission does not require separate figures as to the number of kw. hrs. sold and dollars of revenue received on each rate-schedule. The Commission has authority to do so. The following quotation is from an article by Philip Cabot, former general manager of the Turner Falls Power and Electric Company, in the *Harvard Business Review* for July, 1929. The italics are his.

"Starting with the proposition that the 'just and reasonable' prices which the law requires are the competitive prices, and that the objective of public utility price regulation should be to find the prices which would obtain under a system of free competition where both buyer and seller were free agents, I suggest that in order to find such prices for the various services of a public utility, the regulating commission should have before it the records of the company, for the past years, showing, (1) the money received from the customers *under each rate schedule, including the prices charged in each classification and the quantities sold*—these facts are not now available to the commission and often not even to the officers of the company itself; (2) the money paid out to produce and deliver the total quantities, including as part of this the money paid out for so-called fixed charges. These should include, besides taxes, sums set aside for depreciation, interest on borrowed money, and dividends paid to stockholders, and it is important to understand clearly the exact nature of these charges, because there is much confused thinking about them."

His statement that many managers do not now have this information is open to question. Any manager who fails to get it is either incompetent or has deliberately avoided the figures lest they be used against him in a rate case.

Summary

The foregoing analysis has pointed out:

1. That though there may be at present some variations in the prices paid, there should in the long run be no important difference in the wholesale cost of electricity to municipal plants and private companies of equal size, since both will secure their supply from a few large generating plants.
2. That the distribution costs of private companies are somewhat less than those of the municipal plants.

3. That the municipal plants have almost no new business expense whereas the private companies spend from 10 to 25 cents per customer per month for this purpose.

4. That commercial and general expense is very much higher for the private companies and that the average difference of 25 cents per customer per month is attributable principally to the higher cost of management.

5. That the municipal plants make a somewhat smaller allowance for depreciation than do the private companies.

6. That the municipal plants have been so largely paid for through the surplus earnings of past years that they are in general paying almost negligible amounts of interest.

7. That approximately 25% of the gross revenue of the private companies is paid out for taxes, interest and dividends, 10% for the former and 15% for capital.

8. That as the net result of all these variables, and more particularly of the

last mentioned, the average domestic consumer of a municipal plant is paying appreciably less for electricity than a similar customer of a private company; but that more of the private companies have rate forms which encourage a freer use of electricity.

9. That the annual reports filed with the Department of Public Utilities can be made materially more valuable by the addition of a few important details.

If the amounts paid as salaries to the higher executives of the private companies and management fees absorb all savings resulting from more economical buying of supplies and a more efficient direction of the rank and file of the organization, there will be nothing left to offset the inherent advantage of the municipal plants in the matter of interest.

So far as taxes are concerned the average consumer is undoubtedly better off with untaxed electricity and a higher tax rate on real estate, provided the electric rates reflect the absence of taxes. Not only will he probably pay less in total, but an increased use of electricity will not be penalized by greater taxes. If the electric plant is taxed, every additional kw. hr. carries with it a concealed tax burden.

The conclusion by no means follows from what has been said that it would be an advantage to Massachusetts if all the present private companies should become municipal properties. On the contrary, the character of the government of many of our cities is such that, in the opinion of the writer, it would be a calamity of the first magnitude if they should take over the local electric and gas plants. A number of years ago when the rates of the Boston Edison Company were relatively higher than they are today, a certain customer of that company remarked that the best argument he knew in favor of municipal ownership

was the domestic rate-schedule of the Boston Edison Company and that the best argument he knew in favor of private ownership was the quality of the Boston City Council. In certain localities where rates are out of line and where there is a reasonable amount of civic pride and self-respect, the consumers may well demand lower rates and if they fail to get them start proceedings to have the town acquire the local distributing system.

It would also be a calamity if the private companies should acquire the existing municipal plants. The present situation with private companies and municipal plants existing simultaneously in adjacent communities is far healthier

than it would be if either group entirely superseded the other. The private companies, with the highest quality of engineering at their disposal, can continue to pioneer and develop improved methods in the generating plant, on the lines, and in the office. The more efficient of the municipal plants with their lower rates are a potent aid to regulation—in fact, a most effective form of regulation. They tend to hold domestic rates in neighboring communities within reasonable limits and, if a shortsighted holding company should carry too far inflation of local operating costs and fixed charges, the municipal plants might well provide an invaluable standard of comparison.

Summaries of Research

Cost of Railway Capital Through June, 1931*

Volume and Number of Issues. The year 1930 marks the peak in the volume of railway securities issued in any one year under the authority of the Interstate Commerce Commission as provided by the Transportation Act of 1920. During the period 1920 through 1930, almost half (48.3%) of the total number of interest-bearing security issues were bonds and the balance was divided about equally between equipment trust certificates (25.8%) and miscellaneous securities (25.9%). The bulk (71.4%) of the volume of securities issued during the period was in bonds, 22.8% in equipment trust certificates, and only 5.8% in miscellaneous securities. Notes, de-

bentures, and receivers' certificates are classed as miscellaneous securities.

The increased volume of 1930 over 1929 is noteworthy. In this increase it is evident that capital was diverted from stock investment into fixed income forms. In 1930, \$66,000,000 in stock were issued, while in 1929 stocks totaled \$209,000,000. In contrast, interest-bearing securities totaled \$957,000,000 in 1930 against \$573,000,000 in 1929. (Table I). The rise in volume was not a result of refunding operations since 76% of this amount represented new capital.

Bonds increased substantially in both number and volume of issues in 1930. In contrast equipment trust certificates

*See Herbert B. Dorau, "The Cost of Railway Capital Under the Transportation Act of 1920," 3 *Journal of Land & Public Utility Economics* 1-20 (February, 1927); 3 *Ibid.*, 219-221 (May, 1927); 3 *Ibid.*, 427-430

(November, 1927); 4 *Ibid.*, 206-208 (May, 1928); 4 *Ibid.*, 427-428 (November, 1928); 5 *Ibid.*, 203-204 (May, 1929); 6 *Ibid.*, 98-101 (February, 1930); and 7 *Ibid.*, 94-97 (February, 1931).

TABLE I. AVERAGE YIELD AT PRICE TO COMPANY OF ALL STEAM RAILWAY SECURITY ISSUES, 1920*-1931.

Year	All Classes			Bonds			Equipment Trust Certificates			Miscellaneous†		
	Par Value Sold	Average Yield Per Dollar at Price to Company	Number of Issues	Par Value Sold	Average Yield Per Dollar at Price to Company	Number of Issues	Par Value Sold	Average Yield Per Dollar at Price to Company	Number of Issues	Par Value Sold	Average Yield Per Dollar at Price to Company	Number of Issues
1920.....	\$ 54,543,000	7.39%	14	\$ 35,710,500	7.34%	5	\$ 15,777,000	7.38%	4	\$ 3,046,500	6.68%	5
1921.....	418,744,400	7.21	60	350,944,400	7.23	30	40,741,600	6.76	17	26,808,000	7.64	13
1922.....	438,891,604	5.86	88	317,182,600	5.92	49	121,236,000	5.71	37	77,004	6.00	2
1923.....	541,185,632	5.61	100	223,889,300	5.18	38	205,718,000	5.73	57	22,202,333	6.45	14
1924.....	720,891,793	5.54	131	447,084,800	5.61	70	233,000,000	5.47	38	40,715,003	6.11	27
1925.....	520,187,740	5.45	177	316,721,845	5.63	85	145,867,076	5.04	46	17,508,819	5.20	26
1926.....	432,664,310	5.24	168	276,254,000	5.36	71	126,213,500	4.97	37	28,156,210	5.26	60
1927.....	676,594,700	5.13	165	562,030,500	5.16	78	71,079,000	4.61	24	44,285,200	5.68	63
1928.....	484,733,387	4.76	127	392,180,100	4.77	62	55,120,000	4.58	24	35,424,187	5.25	42
1929.....	573,174,734	5.20	135	417,077,500	5.09	62	124,851,000	5.23	31	30,640,234	6.50	42
1930.....	937,450,467	4.95	147	773,968,504	4.94	82	108,431,800	4.76	22	75,010,163	5.33	44
1930												
1st quarter	281,199,647	4.97	46	262,887,000	4.97	25	12,718,400	4.83	6	5,904,247	5.50	15
2nd quarter	464,730,427	5.00	33	340,859,027	4.99	25	78,135,400	4.72	5	45,736,000	5.54	3
3rd quarter	128,451,033	4.89	42	102,078,477	4.84	19	12,973,000	5.02	7	13,401,456	4.79	16
4th quarter	83,088,400	4.73	26	68,144,000	4.69	12	4,000,000	4.54	4	10,318,400	5.05	10
1931												
1st quarter	83,194,795	4.63	32	65,914,318	4.74	30	7,020,000	4.16	1	9,260,477	4.24	11
2nd quarter	231,163,673	4.79	28	197,338,000	4.73	23	5,689,000	3.93	2	28,536,673	5.39	14
1st six months	313,758,467	4.74	60	263,252,318	4.73	32	12,709,000	4.06	3	37,797,149	5.09	27
1920-1930	5,819,449,366	5.43	1303	4,156,658,649	5.44	630	1,338,778,976	5.31	337	334,010,741	5.15	338

*Beginning with May, 1920, the date of the Esch-Cummins Transportation Act.

†Interest-bearing obligations other than bonds and equipment trust certificates, principally notes, debentures and receivers' certificates.

which had enjoyed a sizable increase in popularity in 1929 decreased in number and volume issued in 1930. The miscellaneous group totaled more than double the amount issued in 1929 with an addition of only two in the number of issues.

The total par value of all classes of securities sold during the first six months of 1931 (Table I) declined to less than $\frac{1}{2}$ the volume recorded for the same period of 1930. Bonds and equipment trust certificates experienced a similar decline in both volume and number of issues. This was in spite of three large issues (\$50,000,000 of 4½% bonds of the Pennsylvania Railroad, \$50,000,000 of 4½% bonds of the Southern Pacific and \$75,000,000 of 4½% bonds of the New York Central System) which accounted for about $\frac{1}{8}$ of the volume issued in bonds in the second quarter. Miscellaneous securities increased in the number of issues but the volume decreased during the first half of 1931.

¹ The average yield per dollar, to the company, of all issues for which the price to the company was given (Table I).

Cost of Capital. The cost of capital¹ for all classes of interest-bearing securities was less in 1930 than for any previous year in the study, except 1928. Moreover, the cost thus far in 1931 has touched a new low mark. Following a gradual decrease from 7.29% in 1920 to 4.78% in 1928, the cost rose in 1929 to 5.20%, dropped to 4.95% in 1930, and continued the decline to 4.74% average for the first six months of 1931. The same general trends are indicated by the average yields per dollar for bonds and equipment trust certificates, an extreme low of 3.93% average on two small issues of the latter being noteworthy in the second quarter of this year. Miscellaneous securities have likewise conformed to the same trend, rising to 6.50% in 1929, reversing to 5.33% in 1930, and averaging 5.09% for the first six months of 1931. Averaging the entire period 1920-1930, all classes registered a cost of 5.43%; bonds, 5.44%; equipment trust certificates, 5.31%; and miscellaneous securities, 5.85%. This average is, of

TABLE II. COMPARISON OF PRICE TO COMPANY AND COST TO INVESTOR AT OFFERING PRICE OF SECURITIES ISSUED BY STEAM RAILWAYS, 1920*-1931.

	(M) Par Value Sold	Num- ber of Issues	Price Received by Company		Value at Offering Price		Difference in Price to Company and Investor			
			(N) Total Dollars	(O) Per Hundred	(X) Total Dollars	(Y) Per Hundred	(Z) Total Dollars	(Y-O) (Z) (X)	(Z) (Y-O) (X)	(Z) (Y-O) (X)
All Securities										
1920	\$ 40,007,000	4	\$ 38,609,035	\$96.51	\$ 40,074,508	\$100.17	\$ 1,465,472	3.66	3.66	3.80
1921	370,343,600	20	344,117,282	92.92	360,358,288	97.30	16,241,006	4.38	4.51	4.72
1922	395,096,800	46	369,451,745	93.51	382,314,494	96.76	12,862,749	3.25	3.36	3.48
1923	448,639,000	67	428,063,088	95.41	439,449,077	97.95	11,385,989	2.54	2.59	2.66
1924	686,270,000	83	653,737,953	95.26	672,055,791	97.93	18,317,838	2.67	2.73	2.80
1925	432,611,500	54	411,751,189	95.18	422,531,059	97.67	10,779,870	2.49	2.55	2.62
1926	306,581,000	46	292,911,779	95.54	299,763,342	97.77	6,851,563	2.23	2.28	2.34
1927	567,527,000	51	536,942,467	94.61	550,503,156	97.00	13,560,689	2.39	2.46	2.53
1928	392,260,000	34	375,664,658	95.78	384,218,723	97.95	8,524,066	2.17	2.22	2.27
1929	233,883,000	30	223,390,932	95.51	227,391,581	97.22	4,000,649	1.71	1.79	1.76
1930	780,401,000	66	742,251,074	95.11	759,528,518	97.33	17,277,444	2.22	2.27	2.33
1930										
1st quarter..	196,368,000	14	184,102,305	93.80	189,269,726	96.38	5,077,421	2.58	2.68	2.76
2nd quarter..	409,075,000	32	389,715,627	95.27	398,087,738	97.31	8,372,111	2.04	2.10	2.15
3rd quarter..	105,041,000	14	100,404,690	95.59	102,660,660	97.73	2,255,979	2.14	2.20	2.25
4th quarter..	69,917,000	6	67,938,452	97.17	69,510,385	99.42	1,571,933	2.25	2.26	2.31
1931										
1st quarter..	57,114,000	9	56,446,832	98.83	57,529,622	100.73	1,082,790	1.90	1.88	1.92
2nd quarter..	214,632,000	7	206,580,644	96.25	211,305,257	98.45	4,724,612	2.20	2.24	2.29
1st 6 mos... .	271,746,000	16	263,027,476	96.79	268,834,879	98.93	5,807,402	2.14	2.16	2.21
1920-1930....	4,653,620,400	501	4,416,921,202	94.91	4,538,188,537	97.53	121,267,335	2.61	2.67	2.75

*Beginning with May, 1920, the date of the Esch-Cummins Transportation Act.

course, preponderantly weighted by the large volume of bonds.

Cost of Financing. A somewhat smaller sample must be used in analyzing cost of financing. Table I includes all issues, not privately placed and for which price to the company is available. Tables II and III include only those issues, not privately placed, and over \$100,000 par value for which both price to the company and to the investor are available. Table I includes all issues of Tables II and III.

Table II shows that the price received by the company (Column O) declined slightly in 1930 on a volume of issues over three times that of 1929, whereas the investor paid a slightly higher price per hundred for these issues (Column Y) in 1930 than in 1929. Consequently the difference in average price to the company and to the investor (Y-O) rose from \$1.71 in 1929 to \$2.22 per hundred in

1930. This increase in the bankers' margin combined with the large volume of issues to effect the second largest total, aggregate bankers' margins for the 1920-1930 period (Column Z). This volume was exceeded in 1924 when over \$18,000,000 was paid to bankers for handling a volume of securities somewhat lower than the 1930 total. In the 11-year period railroads have contributed a total of over \$121,000,000 in bankers' margins receiving an average of \$2.61 per hundred dollars of par value issued. Expressed in other ways ($\frac{Z}{X}$), the ratio of the bankers' share to the price paid by the investor, averaged 2.67 for the period 1920-1930, and ($\frac{Z}{N}$), the ratio of the bankers' share to the price received by the company, was 2.75.

In Table III these measures are expressed for each class of security as well as for the total, and in addition the yield

TABLE III. SUMMARY OF COST OF FINANCING EXPRESSED IN VARIOUS WAYS; BY YEARS, AND FOR THE PERIOD, 1920-1931.

Year	All Classes				Bonds				Equipment Trust Certificates				Miscellaneous				
	y-o	$\frac{z}{x}$	$\frac{z}{n}$	Yield Difference	y-o	$\frac{z}{x}$	$\frac{z}{n}$	Yield Difference	y-o	$\frac{z}{x}$	$\frac{z}{n}$	Yield Difference	y-o	$\frac{z}{x}$	$\frac{z}{n}$	Yield Difference	
1920	.366	3.66	3.80	.52	3.47	3.47	3.59	.50	3.98	3.97	4.13	.56	...	...	...	...
1921	4.38	4.51	4.72	.47	4.54	4.68	4.91	.50	2.44	2.44	2.50	.08	2.68	2.78	2.86	.39	
1922	3.25	3.36	3.48	.29	3.55	3.69	3.83	.26	2.28	2.30	2.35	.35	...	...	...	...
1923	2.54	2.59	2.66	.32	2.05	2.74	2.82	.16	2.55	2.58	2.65	.38	1.51	1.52	1.55	.67	
1924	2.67	2.73	2.80	.24	3.16	3.26	3.37	.23	1.86	1.88	1.91	.08	1.71	1.71	1.74	.86	
1925	2.49	2.55	2.62	.24	2.74	2.82	2.90	.21	1.75	1.76	1.79	.31	4.75	4.80	5.04	1.20	
1926	2.23	2.28	2.34	.21	2.62	2.66	2.77	.18	1.48	1.50	1.52	.24	1.00	1.01	1.02	.54	
1927	2.39	2.46	2.53	.16	2.60	2.70	2.77	.16	.66	.66	.66	.10	2.00	2.02	2.06	.74	
1928	2.17	2.22	2.27	.14	2.33	2.38	2.44	.13	.64	.64	.65	.10	1.75	1.76	1.79	.65	
1929	1.71	1.79	1.76	.23	2.46	2.59	2.52	.20	.89	.93	.92	.15	2.00	2.00	2.00	.75	
1930	2.22	2.27	2.33	.15	2.43	2.51	2.57	.15	.78	.78	.79	.13	1.75	1.78	1.81	.29	
1930	1st quarter..	2.58	2.68	2.76	.16	2.71	2.82	2.90	.17	.64	.64	.65	.11	...	...	...
	2nd quarter.	2.04	2.10	2.15	.14	2.35	2.43	2.49	.14	.74	.74	.74	.12	...	...	...
	3rd quarter	2.14	2.20	2.25	.14	2.26	2.32	2.37	.12	1.23	1.24	1.25	.21	...	...	...
	4th quarter	2.25	2.26	2.31	.13	2.29	2.30	2.35	.12	1.75	1.78	1.81	.29
1931	1st quarter..	1.90	1.88	1.92	.11	2.10	2.09	2.13	.11	.45	.44	.44	.08	...	...	...
	2nd quarter.	2.20	2.24	2.29	.14	2.38	2.43	2.49	.12	.41	.40	.40	.06	1.00	1.00	1.01	.37
	1st 6 months	2.14	2.16	2.21	.14	2.32	2.35	2.41	.13	.43	.42	.42	.08	1.00	1.00	1.01	.37
1920-1930....		2.61	2.67	2.75	.23	2.91	3.00	3.09	.21	1.77	1.79	1.82	.26	1.75	1.76	1.79	.74

y-o is the difference between the average price per hundred received by the company and the average price per hundred paid by the investor.

$\frac{z}{x}$ —Ratio of the bankers' share to the actual dollars received by the company.

$\frac{z}{n}$

$\frac{z}{n}$ —Ratio of bankers' share to the value of the issue or issues at the price at which the investor absorbed them.

$\frac{x}{z}$

$\frac{x}{z}$ —Yield difference—difference between yield per dollar to maturity at price to the company, and at price paid by the investor.

difference or the difference between the yield per dollar to maturity at price to the company and at price to the investor is presented.

In 1930 there was a decrease in the cost of financing for each class of security yet the cost of financing for "all classes" of securities increased, except when measured by the yield difference. This situation is attributable to the increase in volume of equipment trust certificates in 1929. The proportion of equipment trust certificates had risen from 8.6% of the total in 1928 to 45.1% in 1929. In 1930, they resumed their relative position at 12.9% of the total.

The cost of financing continues to decrease in 1931 for "all classes" of securities and for each class of security with one exception. Miscellaneous securities, when measured by the yield difference, reflect an increase over 1930 although other measures indicate a decrease in cost.

The "cost of capital" which includes all costs incurred in procuring capital

and the "cost of financing" which is only the part which accrues to the bankers have shown a tendency to decrease throughout the period and still continue to do so in the first six months of 1931.

In the light of this trend in the cost of railway capital it is of interest to note the trend in return earned on investment and return earned on stock of all operating steam railways of the United States (excluding switching and terminal companies) as reported by the Interstate Commerce Commission.²

Year	Return Earned	
	On Investment	On Stock
1920.	.06	5.45
1921.	2.96	3.94
1922.	3.74	4.85
1923.	4.56	6.95
1924.	4.44	6.70
1925.	4.89	8.19
1926.	5.15	9.43
1927.	4.41	7.78
1928.	4.75	8.79
1929.	4.96	9.92
1920-1929.	4.08	6.19

² 44th Annual Report of the Interstate Commerce Commission, 1930.

RUTH A. FOLEY

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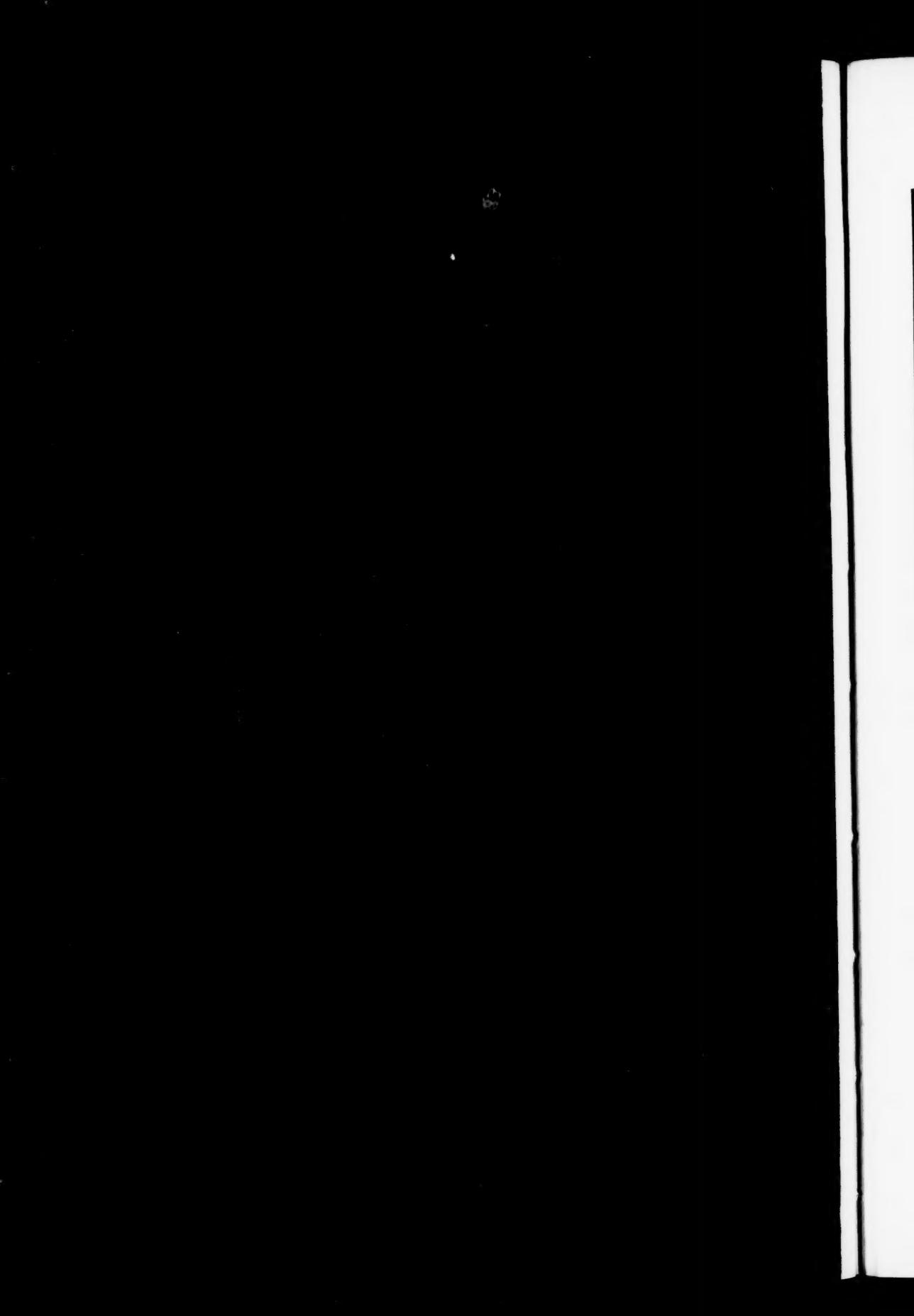
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